ORDER NO. DPD83070011C8

Service Manual

Quartz Direct Drive Automatic Turntable System

SL-QL15

[E], [EK], [XL], [EG], [EB]
[EH], [EF], [Ei], [EC], [XA], [XM]

SL-QL15(K)

[E], [EK], [EG], [EH], [EF], [XA]

* The colors of this model include silver and black.
* The black type model is provided with (K) in the Service Manual.

T4P is the standard mark for plug-in-connector type. Products carrying this mark are interchangeable and adaptable among eath other.

Areas

* [E] is available in Switzerland and Scandinavia.
* [EK] is available in United Kingdom.
* [XL] is available in Australia.
* [EG] is available in F.R. Germany.
* [EB] is available in Belgium.
* [EH] is available in Holland.
* [EF] is available in France.
* [Ei] is available in Italy.
* [EC] is available in Czechoslovakia.
* [XA] is available in Southeast Asia, Oceania, Africa, Middle Near East and Central South America.
* [XM] is available in Central South America.

Specifications

Specifications are subject to change without notice for further improvement.
Weight and dimensions shown are approximate.

■ General

Power supply:	For United Kingdom and Australia: 240V, AC 50 Hz For Continental Europe: 220V, AC 50 Hz For others: 110–120/220–240V, AC 50/60 Hz
Power consumption:	11W
Dimensions: (WxHxD)	43x8.8x35 cm 43x38.5x35 cm (Maximum height when dust cover is open.)
Weight:	5.1 kg (11.2 lb.)

■ Turntable section

Type:	Direct drive Automatic turntable Auto start/Auto lead-in Auto return Auto stop Programmable band selection Repeat play Auto speed select Manual speed selection possible Auto size select Record presence detection
Drive method:	Direct drive
Motor:	Brushless DC motor
Drive control method:	Quartz-phase-locked control
Turntable platter:	Aluminium die-cast Diameter 30 cm (12")
Turntable speeds:	33-1/3 rpm and 45 rpm Auto speed select (Manual selection possible)
Wow and flutter:	0.012% WRMS* 0.025% WRMS (JIS C5521) ±0.035% peak (IEC 98A Weighted)

* Measured by obtaining signal from built-in frequency generator of motor assembly.

Rumble:	–56 dB (IEC 98A Unweighted) –80 dB (IEC 98A Weighted)

■ Tonearm section

Type:	Dynamic balanced type Linear tracking tonearm 4-pivot gimbal suspension
Effective length:	10.5 cm (4-1/8")
Tracking error angle:	Within ±0.1°
Effective mass:	9 g (including cartridge)
Resonance frequency:	12 Hz
Toneram drive motor:	DC motor

Technics

Matsushita Electric Trading Co., Ltd.
P.O. Box 288, Central Osaka Japan

SL-QL15

■ **Cartridge section**

Type:	Moving magnet stereo cartridge
Magnet circuit:	All laminated core
Frequency response	10 Hz~50 kHz 20 Hz~10 kHz ±1 dB
Output voltage:	2.5 mV at 1 kHz, 5 cm/s. zereo to peak lateral velocity (7 mV at 1 kHz, 10 cm/s. zereo to peak 45° velocity [DIN 45 500])
Channel separation:	More than 22 dB at 1 kHz
Channel balance:	Within 1.8 dB at 1 kHz
Recommended load impedance:	47 kΩ~100 kΩ
Compliance (dynamic):	12×10^{-6} cm/dyne at 100 Hz
Stylus pressure range:	1.25 ±0.25 g (12.5 ±2.5 mN)
Weight:	6 g (cartridge only)
Replacement stylus:	EPS-33ES (Elliptical stylus)

■ CONTENTS

	Page
SAFETY PRECAUTION	2
LOCATION OF CONTROLS	3,4
DISASSEMBLY INSTRUCTIONS	5~9
HOW TO REPLACE CHIPS	9
HOW TO SET THE TONEARM DRIVE ROPE	10
MEASUREMENTS AND ADJUSTMENTS	10~12
TROUBLE SHOOTING	13~15
REPLACEMENT PARTS LIST (Electric Parts)	16
RESISTOR AND CAPACITORS	17
BLOCK DIAGRAM	18,19
CIRCUIT BOARD AND WIRING CONNECTION DIAGRAM	20~22
SCHEMATIC DIAGRAM	23~26
EXPLODED VIEW	27,28
REPLACEMENT PARTS LIST (Cabinet and Chassis Parts)	29
PACKINGS	30

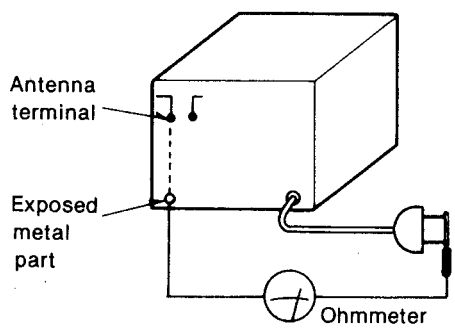
■ SAFETY PRECAUTION

1. Before servicing, unplug the power cord to prevent an electric shock.
2. When replacing parts, use only manufacturer's recommended components for safety.
3. Check the condition of the power cord. Replace if wear or damage is evident.
4. After servicing, be sure to restore the lead dress, insulation barriers, insulation papers, shields, etc.
5. Before returning the serviced equipment to the customer, be sure to make the following insulation resistance test to prevent the customer from being exposed to a shock hazard.

• INSULATION RESISTANCE TEST

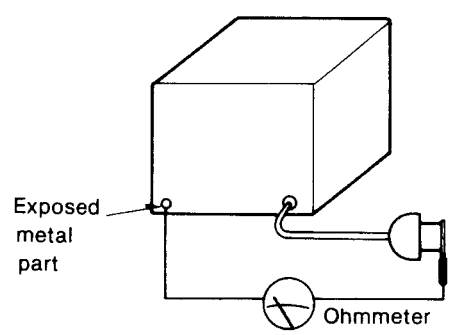
1. Unplug the power cord and short the two prongs of the plug with a jumper wire.
2. Turn on the power switch.
3. Measure the resistance value with ohmmeter between the jumpered AC plug and each exposed metal cabinet part, such as screwheads antenna, control shafts, handle brackets, etc. Equipment with antenna terminals should read between 3MΩ and 5.2MΩ to all exposed parts. (Fig. A) Equipment without antenna terminals should read approximately infinity to all exposed parts. (Fig. B)

Note: Some exposed parts may be isolated from the chassis by design. These will read infinity.



(Fig. A)

Resistance = 3MΩ—5.2MΩ

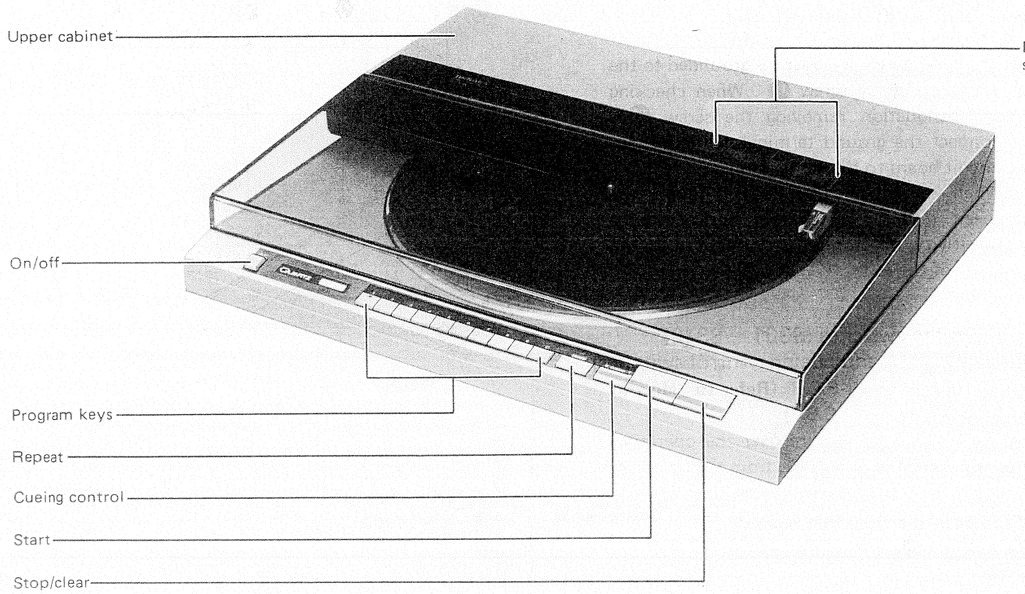


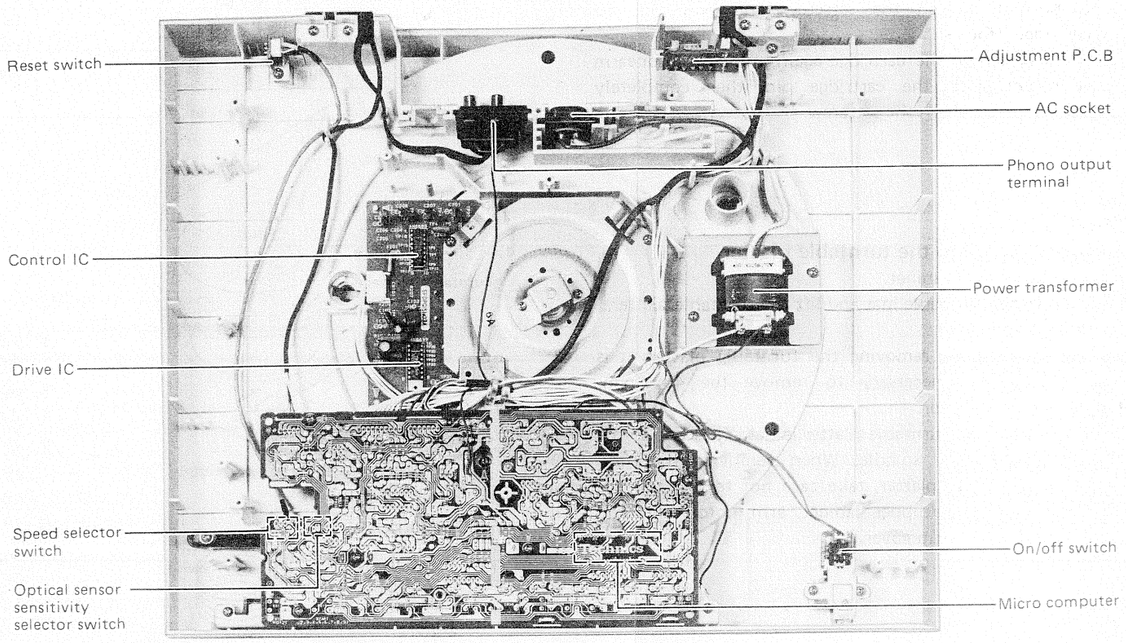
(Fig. B)

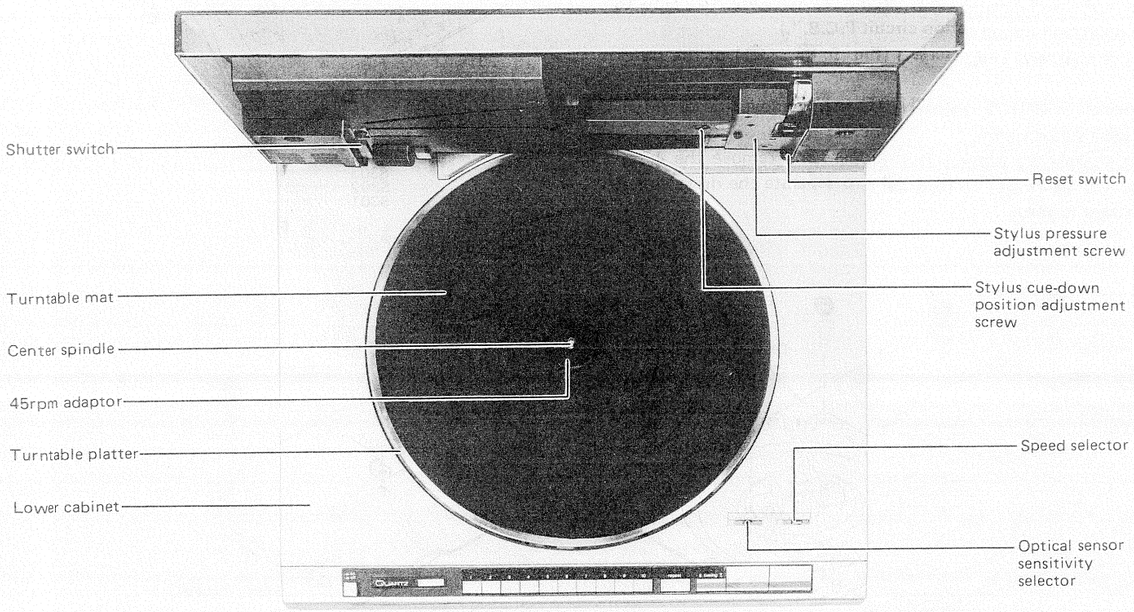
Resistance = Approx ∞

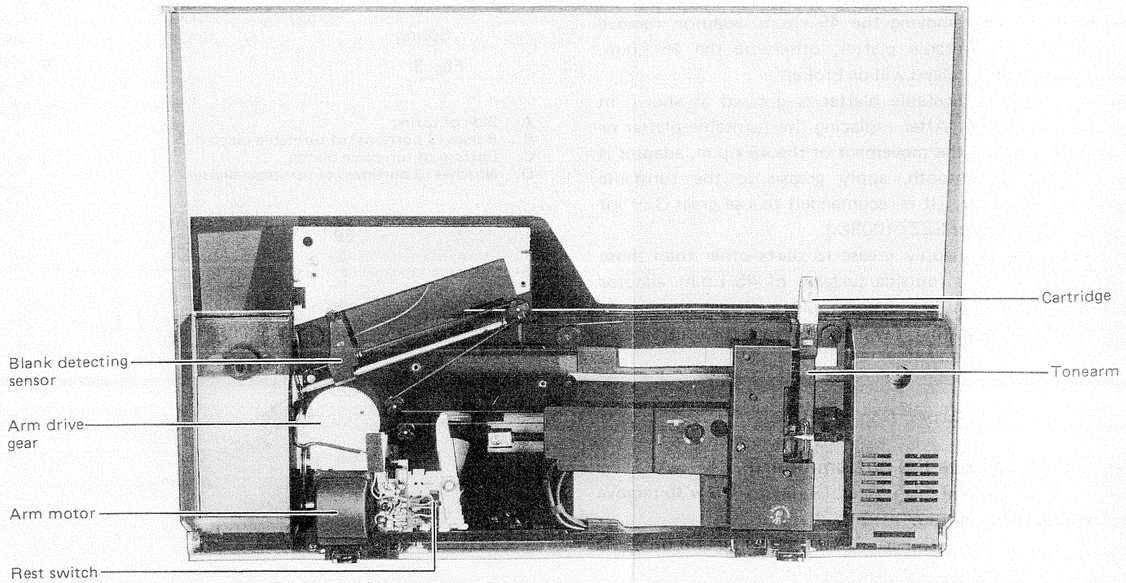
4. If the measurement is outside the specified limits, there is a possibility of a shock hazard. The equipment should be repaired and rechecked before it is returned to the customer.

■ LOCATION OF CONTROLS









■ DISASSEMBLY INSTRUCTIONS

• How to remove the cartridge

1. Open the upper cabinet.
2. Completely loosen the setscrew and pull out the cartridge. (**Fig. 1**)
3. When attaching the cartridge again, match the tonearm connector with the cartridge pin, then completely insert it and tighten the setscrew.

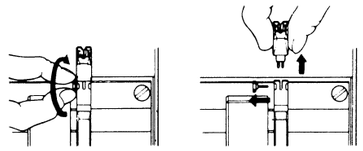


Fig. 1

• How to remove the turntable platter

1. Open the upper cabinet.
2. Remove the turntable mat and lift the turntable platter. (**Fig. 2**)

Note: (1) When removing the turntable platter, it is not necessary to remove the 45 r.p.m. adaptor.

(2) The turntable platter is tight fitted on to the center spindle. When removing the turntable platter, take care not to give damage to the upper cabinet, arm motor cover and tonearm cover.

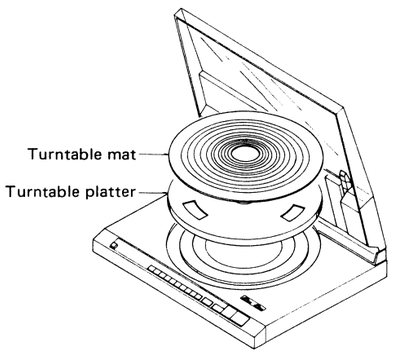


Fig. 2

• How to remove the 45 r.p.m. adaptor

1. Remove the turntable platter.
2. The 2 adaptor claws fit into the turntable platter, and so remove the 45 r.p.m. adaptor by pushing it in the direction of the arrow. (**Fig. 3**)

Note: When removing the 45 r.p.m. adaptor, remove the turntable platter, otherwise the 45 r.p.m. adaptor claws will be broken.

*The turntable platter is greased as shown in **Fig. 4**. After replacing the turntable platter or when the movement of the 45 r.p.m. adaptor is not smooth, apply grease to the turntable platter. (It is recomended to use greas 3 of kit number SZZE1003C.)

Note: Do not apply grease to parts other than those specified (outside surfaces of 45 r.p.m. adaptor in particular). Also, apply a proper amount of grease so that it will not run into the unit.

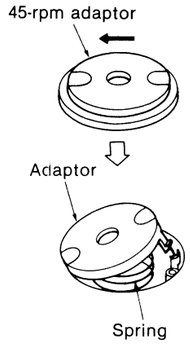


Fig. 3

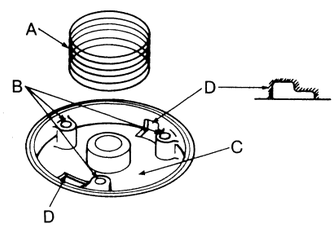


Fig. 4

A: Side of spring
B: Bosses (3 portions) of turntable platter
C: Bottom of turntable platter
D: Notches (2 portions) of turntable platter

• How to remove the bottom board

1. Remove the turntable platter. (**Refer to "How to remove the turntable platter."**)
2. Close the upper cabinet and turn over the unit on a soft cloth taking care not to damage the upper cabinet.
3. Remove the 6 setscrews (**Fig. 5** ❶ ~ ❻), 4 Insulators and 4 springs (**Fig. 5**)

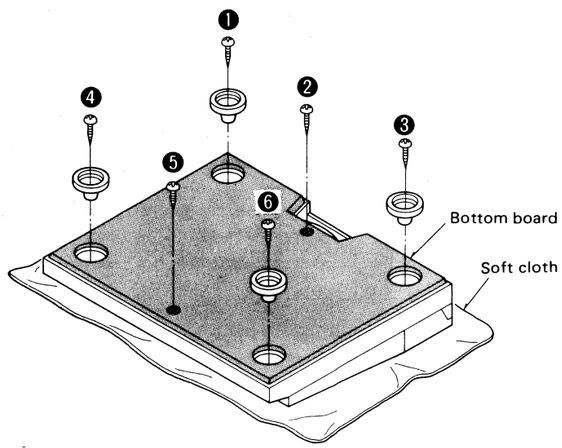


Fig. 5

• How to remove the operation circuit P.C.B.

1. Remove the bottom board. (**Refer to "How to remove the bottom board."**)
2. Remove the 7 setscrews (**Fig. 6:** ❼ ~ ⓭) of the operation circuit P.C.B. and lead wired from the lead clamper.

Note: (1) This printed circuit board is grounded to the stator frame by screw ⓭. When checking for conduction removing the screw ⓭, connect the ground terminal of the printed circuit board to the stator frame.

(2) When mounting the P.C.B., insert the speed selector switch and optical sensor sensitivity selector switch knobs into the holes of the rod.

• How to remove the switches (S301 ~ S312)

(Program keys, repeat and cueing control switches)

1. Remove the operation circuit P.C.B. (**Refer to "How to remove the operation circuit P.C.B."**)
2. To remove the switch holder, turn over the operation circuit P.C.B. and release the L.E.D. from the 2 switch holder's claw. (**Fig. 7**)
3. To remove S301~S305, release the 3 switch holder's claws (**Fig. 8:** ⓮ ~ ⓰) and remove the switch holder in the direction of the arrow.
   * Remove the 5 switches (S306~S310) and 2 switches (S311 and S312) in the same way.
4. Unsolder the 4 switch terminals and remove the switch. (**Fig. 8**)

• How to remove the drive circuit P.C.B. and stator frame

1. Remove the operation circuit P.C.B. (**Refer to "How to remove the operation circuit P.C.B.".**)
2. Remove the 4 setscrews (**Fig. 9:** ⓱ ~ ⓴) of the stator frame.
3. Pull out connector CN101, then remove the drive circuit P.C.B. with stator frame.
4. Cut off the stopper by nippers and remove the 4 setscrews (**Fig. 10:** ㉑ ~ ㉔) to separate the drive circuit P.C.B. and stator frame.

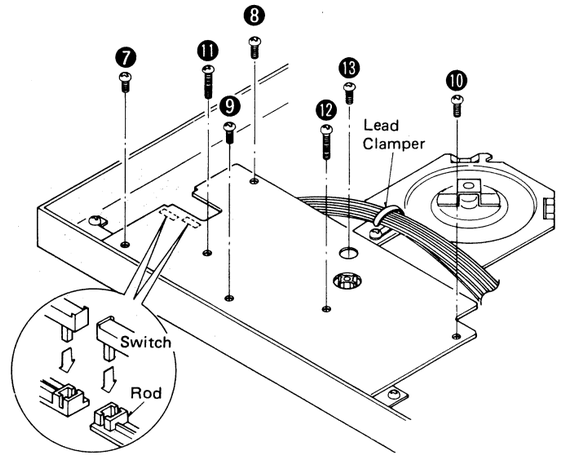


Fig. 6

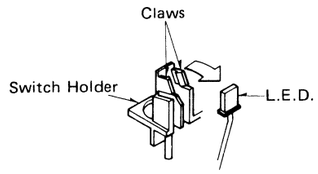


Fig. 7

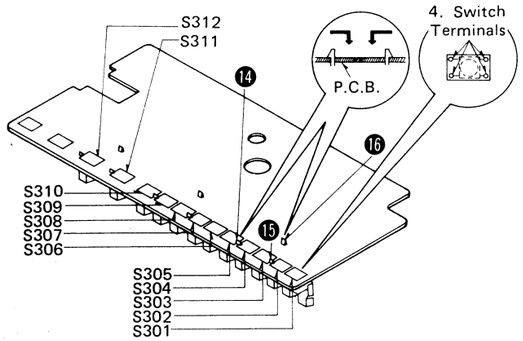


Fig. 8

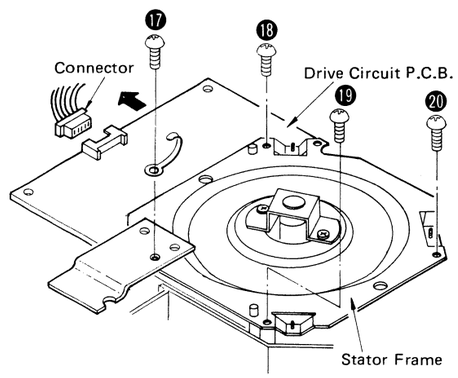


Fig. 9

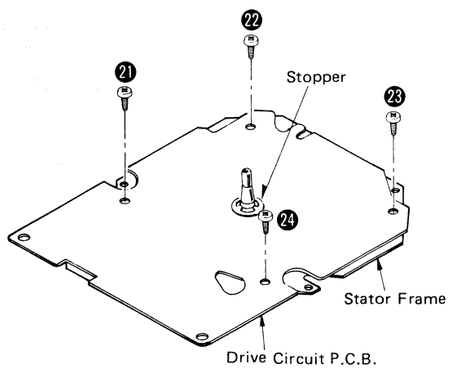


Fig. 10

• How to remove the arm moto cover

1. Open the upper cabinet.
2. Remove the 5 setscrews (**Fig. 11:** ㉕ ~ ㉙), and the arm motor cover can be removed in the direction of the arrow Ⓐ .

• How to remove the tonearm cover

1. Open the upper cabinet.
2. Remove the 3 setscrews (**Fig. 11:** ㉚ ~ ㉜), and the tonearm cover can be removed in the direction of the arrow Ⓑ .

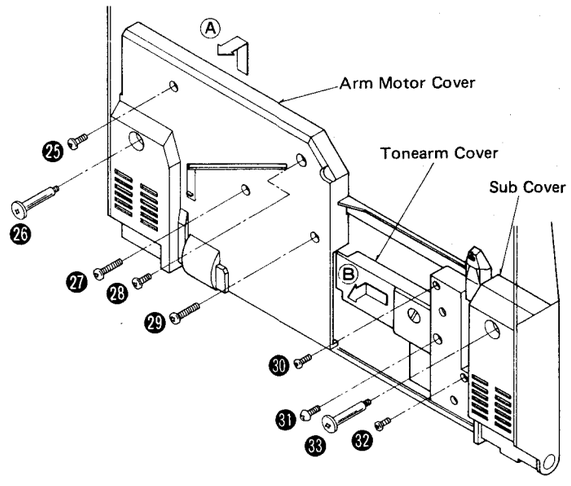


Fig. 11

• How to remove the dust cover

1. Open the upper cabinet.
2. Remove the arm motor cover. (**Refer to "How to remove the arm motor cover."**)
3. Remove the sub cover setscrew (**Fig. 11:** ㉝) and the sub cover.
4. Turn the worm gear pulley by finger to shift the tonearm inward.
5. Remove the 3 setscrews (**Fig. 12:** ㉞ ~㊱) of the dust cover.
6. Remove the 2 setscrews (**Fig. 13:** ㊲ , ㊳) of the dust cover. Then the dust cover can be removed.

• How to remove the blank detecting sensor

1. Open the upper cabinet and remove the arm motor cover.
2. Unsolder the lead wires of the blank detecting sensor.
3. Remove the screw of the guide plate. (**Fig. 12:** ㊴)
4. Remove the rope fixture of the sensor. (**Fig. 12**)
5. Remove the guide rod fitting clip ㊵ and remove the guide rod. (**Fig. 12**)
6. Pull out the sensor in the direction of the arrow Ⓐ . (**Fig. 12**)

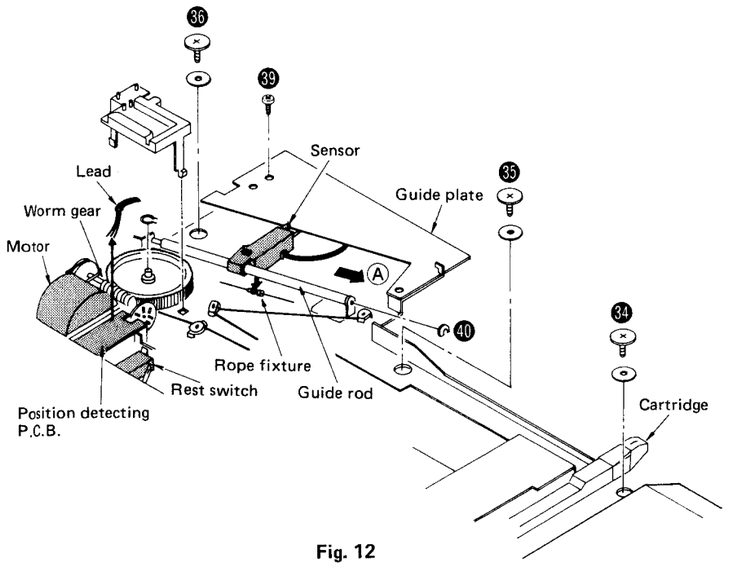


Fig. 12

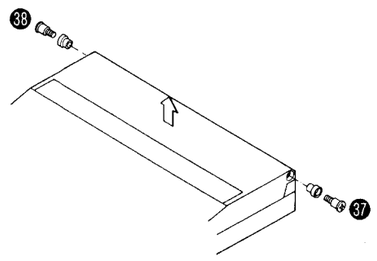


Fig. 13

• How to separate the upper cabinet and lower cabinet

1. Remove the bottom board. (**Refer to "How to remove the bottom board."**)
2. Unsolder the ground lead wire from the phono output jack, and remove the phono output jack from the lower cabinet.
3. Pull out the 2 connectors (**CN301, CN401**) from the operation circuit P.C.B. (**Fig. 14**)
4. Remove the P.C.B. holder setscrew (**Fig.** ㊶) and P.C.B. holder.
5. Remove the 4 hinge setscrews (**Fig. 15:** ㊷ ~ ㊺).
6. Release the claws and slowly lift the lower cabinet to separate it from the upper cabinet.

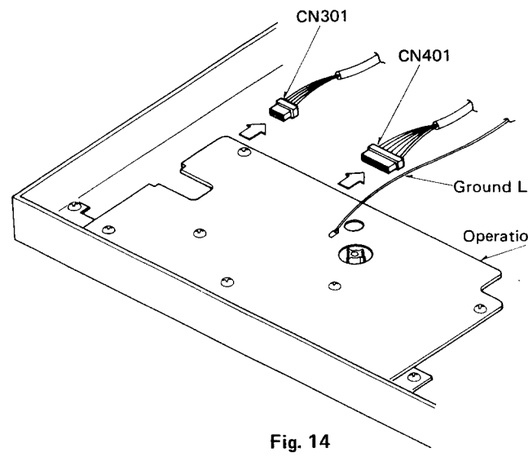


Fig. 14

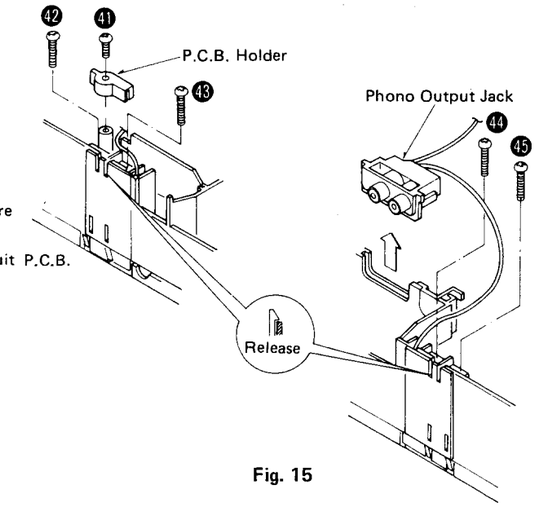


Fig. 15

• How to remove the tonearm

1. Remove the dust cover and tonearm cover. (**Refer to "How to remove the dust cover" and "How to remove the tonearm cover"**).
2. Unsolder the 5 lead wires from the cartridge (**Fig. 16**).
3. Remove the tonearm setscrew (**Fig. 17:** ㊺).

• How to remove the cueing control ass'y

1. Remove the tonearm cover. (**Refer to "How to remove the tonearm cover"**).
2. Unsolder the 2 lead wired from the cueing plunger (**Fig. 16**)
3. Remove the 2 cueing control ass'y setscrews (**Fig. 16:** ㊻ , ㊼), and the cueing control ass'y can be removed in the direction of the arrow Ⓐ .

• How to remove the tonearm position indicator board

1. Remove the dust cover and tonearm cover. (**Refer to "How to remove the dust cover" and "How to remove the tonearm cover"**).
2. Unsolder the 2 lead wires from the indicator (**Fig. 16**).
3. Remove the tonearm position indicator board setscrew (**Fig. 16:** ㊽).

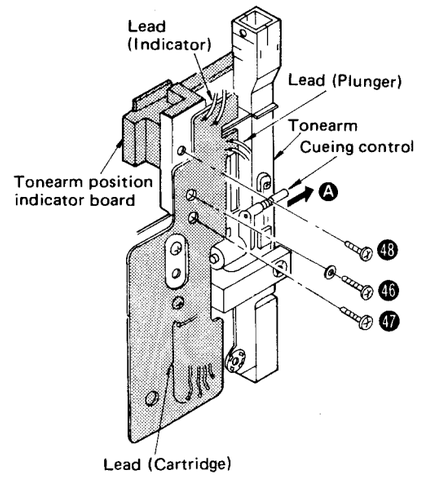


Fig. 16

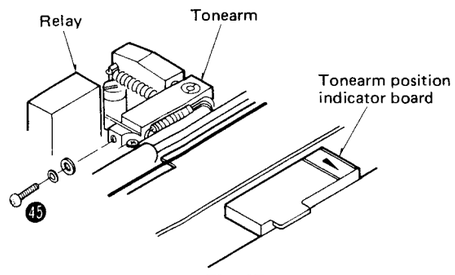


Fig. 17

- **How to remove the Hall element**

1. Remove the turntable platter.
2. Remove the terminal solder by use of solder sucker.
3. Hold the Hall element with a tweezers and remove it while touching the soldering iron to the terminal. **(Fig. 18)**

   Note: Fit the Hall element with the part No. print up. The reverse in terminal position is allowable provided that the printed side is up.

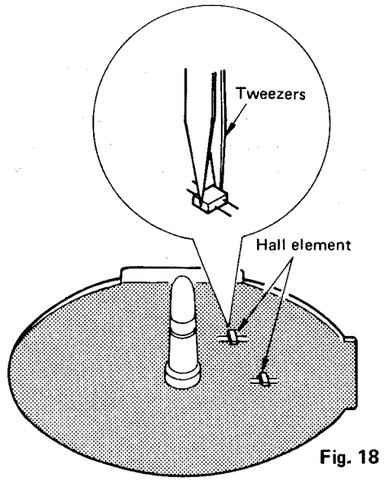


Fig. 18

- **How to remove the cabinet (Reset) switch**

1. Remove the bottom board **(Refer to "How to remove the bottom board.")**
2. Completely open the upper cabinet.
3. Remove the cabinet switch setscrew (**Fig. 19:** ㊾).

   Note: When fitting the cabinet switch, be sure to open the upper cabinet.

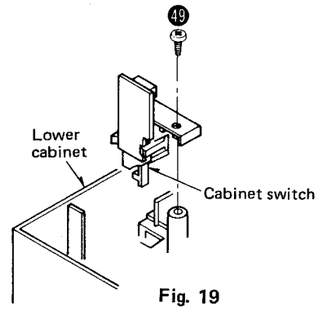


Fig. 19

■ HOW TO REPLACE CHIPS

(Resistor, capacitor and jumper)

- **Removing procedure**

1. Completely remove the solder from both ends of the chip by use of solder suker.
2. Touch the soldering iron to the end of the chip as shown in Fig. 20, then turn the tweezers in the direction of the arrow.

Chip resistor

Do not re-use chip resistor or capacitor without color cord.

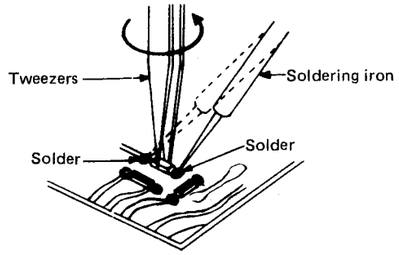


Fig. 20

- **Replacing procedure**

1. Place solder on the foil where the chip is fitted. Then solder the chip by holding the soldering iron as shown in Fig. 21.

Note:

1. If the chip jumper is removed, connect a coated lead wire to the part. (See Fig. 22). Chip jumper is marked with "J" on the printed circuit board.

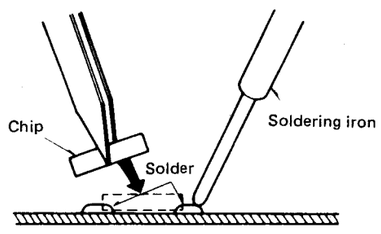


Fig. 21

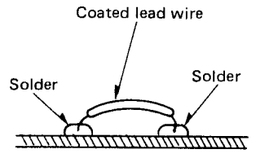


Fig. 22

- **Note for replacing chips**

1. Do not heat the chip more than 3 seconds.
2. Do not rub the electrode against the chip.
3. Use the tweezers with care not to damage the surface of the chip.
4. It is desirable to use a pencil type soldering iron. And use soldering iron less than 60W.

■ HOW TO SET THE TONEARM DRIVE ROPE

Unit the rope according the following procedure.

1. Remove the dust cover. **(Refer to "How to remove the dust cover".)**
2. Remove the lead wire holder. **(Fig. 23)**
3. Remove the C-ring of the arm drive wheel and remove the drive wheel. **(Fig. 23 :** ㊿ **)**
4. Turn over the arm drive wheel, and set the rope in the order of 1 ~ 2. **(Fig. 24)**
5. Holding the rope with the hand, set the drive wheel and rope in the order of 3 ~ 8 of **Fig. 25.**
6. After setting the rope, match in tonearm and sensor with the position of rope fixture, and secure the parts.
7. Turn the worm gear by finger to see that the tonearm and sensor move, then set the C-ring.

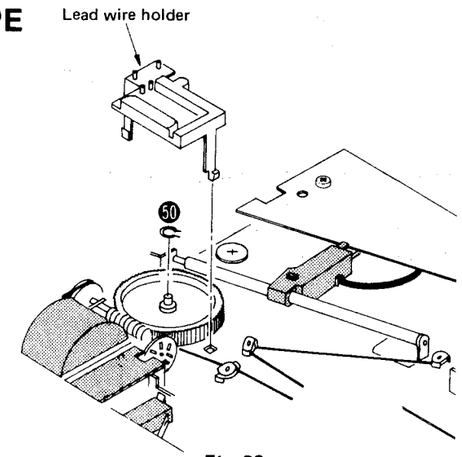


Fig. 23

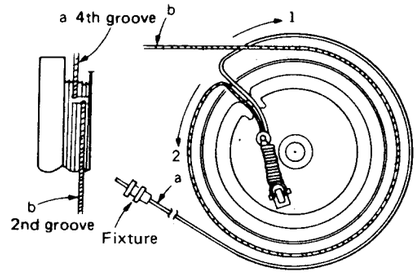


Fig. 24

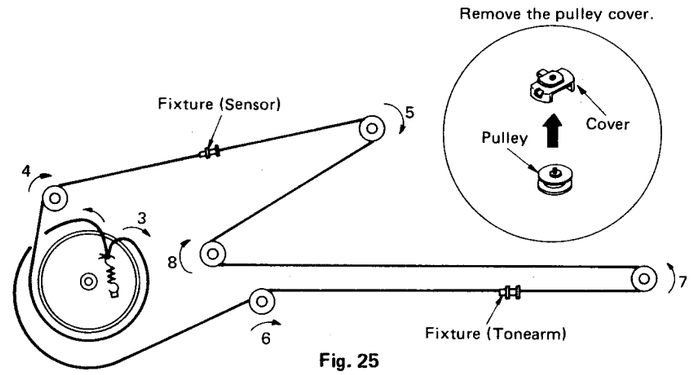


Fig. 25

■ MEASUREMENTS AND ADJUSTMENT

- **Equipment used and condition of the set**

1. Oscilloscope (two channels)
2. DC voltmeter.
3. Record (SFTR007) for adjustment.
4. Connector (SZZP1010F) for adjustment.
5. Remove the bottom board and remove the cover. **(Fig. 29)**
6. Set the optical sensor sensitivity selector to "M".

Step	Item	Preparations for adjustment	Adjusting portion	Adjusting method
1	**Start position**	1. Open the upper cabinet and put on the test record. 2. Turn the power switch on. 3. Push the "Start" switch.	Start position adjusting screw. (Fig. 26)	1. Turn the start position adjusting screw. If it descends between tunes, turn the screw clockwise. If it descends outside the disc, turn the screw counterclockwise.
2	**Clock frequency**	1. Connect Q1 emitter to IC301 14-pin. (Fig. 27) 2. Connect the oscilloscope to IC301 13-pin.	VR301 (Fig. 27)	1. Turn the power switch on. 2. Adjust VR301 so that the cycle of output waveform is 40μs ± 2μs. (Fig. 28)
3	**Sensor gain**	1. Remove the cover and insert the connector for adjustment into terminal CN901. (Fig. 29) 2. Connect the oscilloscope to 6-pin (+) and 1-pin (–). 3. Put on the record for adjustment with side A up.	VR901 (Fig. 26)	1. Turn the power switch on and move the tonearm to the blank area of the record. 2. Adjust VR901 so that the output voltage is 4V ± 0.4V.

Step	Item	Preparations for adjustment	Adjusting portion	Adjusting method
4	**Sensor resolution**	1. Remove the cover and insert the connector for adjustment into terminal CN901. (Fig. 29) 2. Connect the oscilloscope to 7-pin (+) and 1-pin (–). 3. Put on the record for adjustment with side A up.	VR902 (Fig. 26)	1. Turn the power switch on. 2. Push the program key to let it search the tonearm. (Output is delivered between the tunes.) 3. Adjust VR902 so that the peak output between tunes is 3V ± 0.3V. (Fig. 30)
5	**Cueing timer**	1. Remove the cover and insert the connector for adjustment into terminal CN901. (Fig. 29) 2. Connect the unit to the amplifier. (Phono output) 3. Connect 3-pin (+) and 1-pin (–) to the channel (1) of two channel oscilloscope. 4. Connect the speaker terminal of amplifier to the channel (2) of two channel oscilloscope. 5. Connect the 2-pin and 1-pin. (Muting operation stops.) 6. Put on the record for adjustment with side B up.	VR903 (Fig. 26)	1. Turn the power switch on. 2. Move the tonearm to a recorded (groove) part of the record, and push the cueing switch for cueing down. 3. Check the time until completion of cueing (rise of cueing signal) after the stylus touches the record surfase. 4. Adjust VR903 so that the time until completion of cueing is 0.3 ~ 0.5 sec. (Fig. 31) Note: Set the sweep time of oscilloscope to 0.2 sec/cm or 0.5 sec/cm. For example, in the case of 0.2 sec/cm range, adjust it so that the cueing completion signal is delivered 2 scale (0.4 sec) later than delivery of phono output signal.
6	**Descending between tunes**	1. Open the upper cabinet and hold the cabinet switch with tape. 2. Put on the record for adjustment with side B up. 3. Close the upper cabinet. 4. Connect the unit to the amplifier. (Connect the speakers to the speaker terminals.)	Sensor shifting screw (Fig. 32)	1. Turn the power switch on. 2. Push the program key 2, followed by start switch. 3. After completion of cueing down, push the program key 2 for the purpose of skipping. 4. Make sure that descending position is at count "20 ~ 21". 5. If the descending position is wrong, open the upper cabinet and turn the sensor shifting screw. 6. Close the upper cabinet and push the program key 2. 7. Adjust so that the descending position is at count "20 ~ 21". Repeat steps 4 ~ 7.
7	**Tonearm offset angle**	1. Open the upper cabinet and hold the cabinet switch with tape. 2. Close the upper cabinet.	Adjusting screw (Fig. 33)	1. Turn the power switch on and push the start switch to shift the tonearm inward. 2. Open the upper cabinet. 3. Turn the adjusting screw so that the arm center matches the V-groove of the lift bar.
8	**Servo gain and offset voltage**	1. Open the upper cabinet and hold the cabinet switch with the tape. 2. Close the upper cabinet. 3. Connect the DC voltmeter to CN301 terminal 3 and ground terminal. 4. Remove the Label of the tonearm cover.	VR501 (Servo gain) P.C.B. (Offset voltage) (Fig. 32)	1. Turn the power switch on and push the start switch to shift the tonearm inward. 2. Open the upper cabinet. 3. Completely shift the tonearm to the right. Then, adjust VR501 so than the voltage is 3.6V. **(Servo gain)** 4. Set the tonearm to the center and make sure that the output voltage is 1.8V. 5. If the voltage is not 1.8V, loosen the printed circuit board screw and move the board to the right or left with a screw-driver so that the output voltage becomes 1.8V. After the adjustment, tighten the printed circuit board screw. **(Offset adjustment)**

• Adjustment points

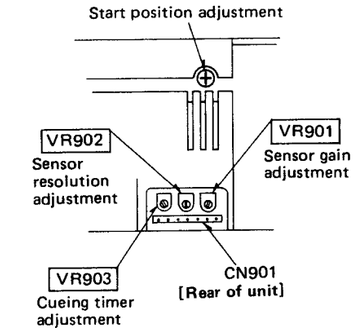


Fig. 26

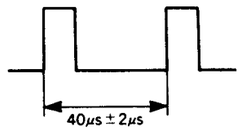


Fig. 28

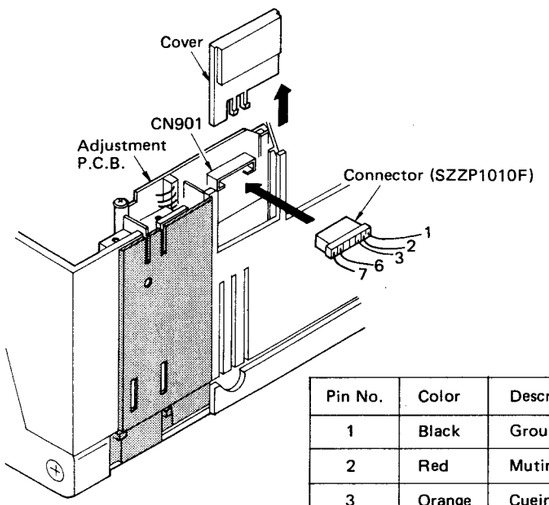


Fig. 29

Pin No.	Color	Description
1	Black	Ground
2	Red	Muting signal
3	Orange	Cueing signal
6	Blue	Sensor amp. output signal
7	Violet	Filter amp. output signal

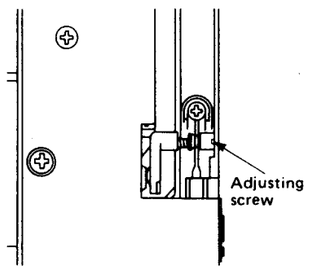
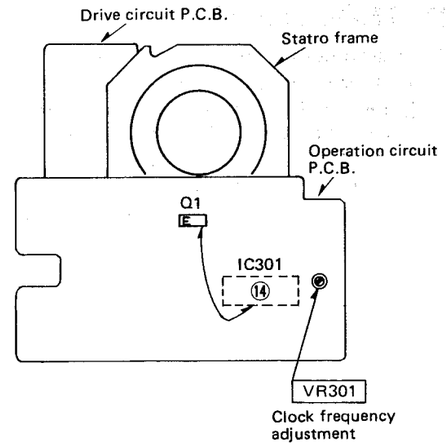


Fig. 33



* Connect between Q1 Ⓔ and IC301 ⑭ pin for clock frequency adjustments.

Fig. 27

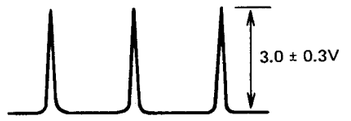


Fig. 30

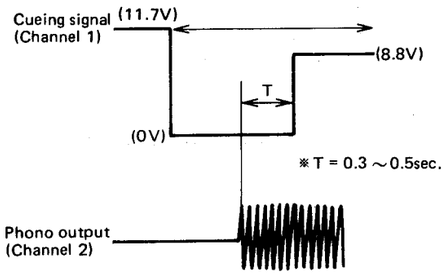


Fig. 31

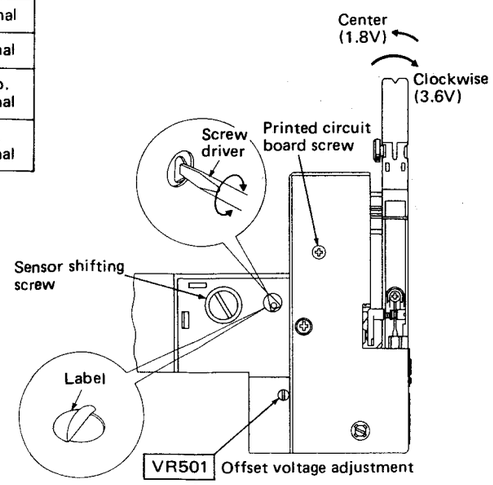


Fig. 32

■ TROUBLE SHOOTING

1. How to use the repair table (Fig. 34)

① Remove the bottom board.
② Remove the operation circuit P.C.B. and connect the P.C.B. ground terminal to the chassis (Stator frame).
③ Put the unit on the repair table.
④ Fit the turntable platter and put on the turntable mat.
⑤ Put on the record and check the circuits from under the unit.

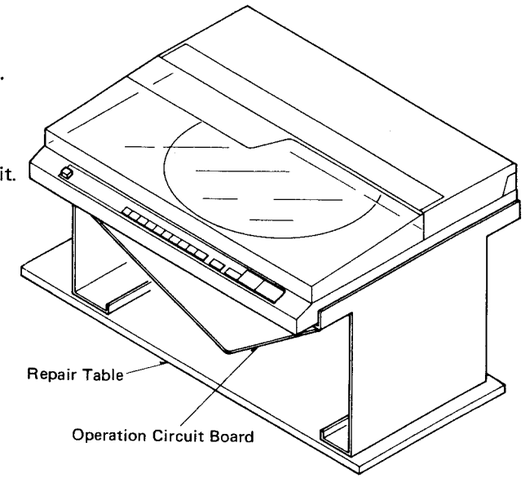


Fig. 34

2. How to raise the set (Fig. 35)

Note: Turntable platter is not fixed on the center spindle. Take care so that the turntable platter will not come loose. Also, take care allow the set to fall down.

① Remove the bottom board.
② Completely open the upper cabinet.
③ Hold the cabinet (Reset) switch with tape.
④ Fit the turntable platter.
⑤ Raise the unit and check the circuits.

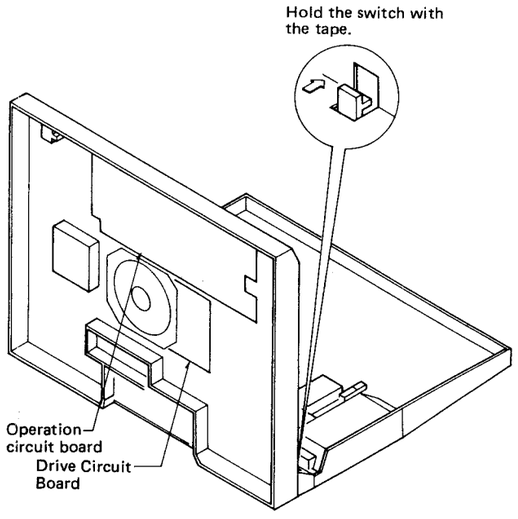


Fig. 35

3. How to turn over the set (Fig. 36)

Note: This purpose is to check the voltage of each circuit during stop of the turntable.

① Remove the turntable platter and turn over the unit.
② Remove the bottom board.
③ Turn the power switch "on" and check the voltage.

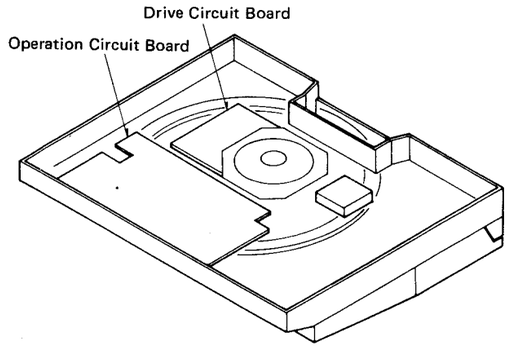


Fig. 36

Turntable dones not rotate

Ⓒ, Ⓑ, Ⓔ of transistor are as follows:
Ⓒ : Collector
Ⓑ : Base
Ⓔ : Emitter

*1
Check points in [ ] are common to all symptoms.

*2
IC301 terminals ⑭ ~ ⑰, ㉑ emit signals when key switch is pushed or speed selector is shifted.

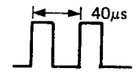
*1

Power source circuit
1. AC18V between BT1 terminals ③ and ④.
2. DC voltage of regulator IC (IC1)
   ① 22V, ② 0V, ③ 12V
3. DC voltage of regulator transistor (Q1)
   Ⓒ 10.2V Ⓑ 5.8V Ⓔ 5.2V

NO → AC cord, S1, T1, D1, IC1, Q1, C1 ~ C5, R1~R4, D2

YES

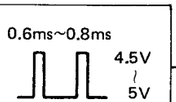
Clock frequency
1. Connect between Q1 Ⓔ and IC301 ⑭.
   Waveform of terminal ⑬ of IC301.



NO → IC301, VR301, R331, C301

YES

*2
Key scan signal
1. Waveform of terminals ⑭ ~ ⑰, ㉑ ~ ㉕ of IC301.



NO → IC301, D312~317, S301~316, S701

YES

Cabinet opening/closing detection
1. DC voltage at terminal of IC301.
   • Close the upper cabinet 1V
   • Open the upper cabinet 0V

NO → S701, IC301

YES

Power supply input terminal
1. DC voltage at terminal ① of IC101. (12V)
2. DC voltage at terminal ⑱ of IC201. (8.5V)

NO → IC101, IC201, R204, R208

YES

Push start switch (S313). ➡

Start/stop and brake circuit
1. DC voltage at terminal ㉛ of IC301. (0V)
2. DC voltage at terminal ⑩ of IC201. (0V)
3. DC voltage at terminal ⑫ of IC201. (0.6V)

NO → IC301, IC201, IC101, S313, C107

YES

Drive coil and Hall element
1. Conduction check of drive coils. (About 33Ω)
2. DC voltage of Hall elements.
   ① 3.8V, ② 7.6V, ③ 3.8V, ④ 0V

NO → Drive coil, H101, H102, IC101

YES

Drive circuit (Stop)
1. DC voltage at each terminal of IC101.

	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪
Voltage	0V	12V	0V	0V	0V	0V	0V	0V	0V	6V

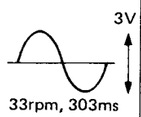
NO → IC101

YES

Drive circuit (Rotation)
1. DC voltage at each terminal of IC101.

	②	③	⑨	⑩	⑪
Voltage	0.6V	12V	4.9V	4.9V	4.7V

2. Waveform between terminal.
   ④ and ⑤ (⑥ and ⑦) of IC101.



NO → IC101

DEUTSCH

Quartz Direct Drive Automatic Turntable System

SL-QL15/(K)

DEUTSCH

- This booklet contains the specifications and adjusting procedures for SL-QL15, written Germany, French and Spanish.
- File this manual together with the SL-QL15 service manual (Order No. DPD83070011C8).

- Diese Broschüre enthält die technischen Daten und die Beschreibungen der Justiermethoden für SL-QL15 in deutscher, französischer und spanisher Sprache.
- Bewahren Sie das Büchlein zusammen mit der Bedienungsanleitung für SL-QL15 (Bestell-Nr. DPD83070011C8) auf.

- Cette brochure contient les spécifications et les procédures de réglage pour le SL-QL15, écrites en allemand, en français et en espagnol.
- Classer ce manuel en même temps qu'avec le manuel de service du SL-QL15 (Nº d'ordre: DPD83070011C8).

- Este librito contiene las especificaciones y procedimientos de ajuste para SL-QL15, escritas en alemán, francés y español.
- Guardar este manual juntamente con el manual de servicio de SL-QL15 (Pedido Nº. DPD8370011C8).

DEUTSCH

■ TECHNISCHE DATEN

Änderungen der technischen Daten vorbehalten.
Die angegebenen Gewichts- und Abmessungsdaten sind ungefähre Werte.

■ Allgemeine Daten

Stromversorgung: Für Kontinentaleuropa: Wechselstrom 50 Hz, 220V
Für andere Länder: Wechselstrom 50/60 Hz, 110–120/220–240V
Leistungsaufnahme: 11W
Abmessungen (BxHxT): 43x8,8x35 cm
43x38,5x35 cm
(Maximale Höhe bei vollständig geöffnetem Gehäuseoberteil)
Gewicht: 5,1 kg

■ Plattenspieler

Typ: Direktangetriebener Automatischer Plattenspieler
Auto-Start/Auto-Zuführung
Rückführautomatik
Stopp-Automatik
Programmierbare Musikstück-Auswahl
Wiederhol-Betrieb
Automatische Drehzahlwahl
Manuelle Drehzahlwahl möglich
Automatische Plattengrößewahl
Plattenpräsenz-Registrierung
Antrieb: Direktantrieb
Motor: Kollektorloser Gleichstrommotor
Antriebsregel-Methode: Quarz-Steuerung QPL
Plattenteller: Aluminium-Druckguß
Durchmesser 30 cm
Plattenteller-Drehzahlen: 33-1/3 und 45 U/min
Automatische Drehzahlwahl (manuelle Wahl möglich)
Gleichlaufschwankungen: 0,012% WRMS
0,025% WRMS (JIS C5521)
±0,035% Spitze
(IEC 98A bewertet)

* Gemessen anhand von Signalen vom eingebauten Frequenzgenerator des Motorbauteils.

Rumpel-Fremdspannungsabstand: –56 dB (IEC 98A unbewertet)
Rumpel-Geräuschspannungsabstand: –80 dB (IEC 98A bewertet)

■ Tonarm

Typ: Dynamisch ausbalancierter Tangential-Tonarm mit Kardanaufhängung mit 4-Punkt-Drehlager
Effektive Länge: 10,5 cm
Spurfehlwinkel: Innerhalb ±0,1°
Effektive Masse: 9g (einschließlich Tonabnehmer)
Resonanzfrequenz: 12 Hz
Tonarm-Antriebsmotor: Gleichstrommotor

■ Tonabnehmer

Typ: Stereo-Magnet-Tonabnehmer
Magnetkreis: Ganzlamellenkern
Frequenzgang: 10 Hz bis 50 kHz
20 Hz bis 10 kHz ± 1 dB
Ausgangsspannung: 2,5 mV bei 1 kHz
5 cm/s. Null-zu-Spitze, lateral
[7 mV bei 1 kHz 10 cm/s. Null-zu-Spitze, 45° (DIN 45 000)]
Kanaltrennung: 22 dB bei 1 kHz
Kanalabweichung: Innerhalb 1,8 dB bei 1 kHz
Empfohlene Endimpedanz: 47 kΩ ~ 100 kΩ
Nachgiebigkeit (dynamisch): 12×10^{-6} cm/dyn bei 100 Hz
Auflagekraft-Einstellbereich: 1,25±0,25 g (12,5 ± 2,5 mN)
Gewicht: 6g (nur Tonabnehmer)
Ersatznadel: EPS-33ES (Elliptische Nadel)

■ JUSTIERUNGEN

- **Verwendete Geräte und Zustand des Gerätes**

1. Osizlloskop
2. Gleichstrom-Voltmeter
3. Platte (SFTR007) für Justierung
4. Anschlußverbindung (SZZP1010F) für Justierung
5. Die Bodenplatte und die Abdeckung abnehmen. (Abb. 29)
6. Den Empfindlichkeits-Wahlschalter das optischen Sensors auf "M" stellen.

Schritt	Gegenstand	Vorbereitungen für die Justierung	Zu justierende Teile	Justiermethode
1	**Startposition**	1. Das Gehäuseoberteil öffnen und eine Platte auflegen. 2. Den Ein/Aus-Schalter einschalten. 3. Den Startschalter drücken.	Absenkpositions-Justierschraube (Abb. 26)	1. Die Absenkpositions-Justierschraube derehen. Wenn er zwischen Musikstücken abgesenkt wird, die Schraube im Uhrzeigersinn drehen. 2. Wenn er außerhalb der Platte abgesenkt wird, die Schraube entgegen dem Uhrzeigersinn drehen.
2	**Uhrfrequenz**	1. Den Emitter von Q1 mit IC301 Stift 14 verbinden (Abb. 27) 2. Das Oszilloskop and IC301 Stift 13 anschließen.	VR301 (Abb. 27)	1. Den Ein/Aus-Schalter einschalten. 2. VR301 so abgleichen, daß der Zyklus der Ausgangswellenform 40μs ± 2μs beträgt. (Abb. 28)
3	**Sensorverstärkung**	1. Die Abdeckung entfernen und die Anschlußverbindung für die Justierung in den Anschluß CN901 einstecken. (Abb.29) 2. Das Oszilloskop an Stift 6 (+) und Stift 1 (–) anschließen. 3. Die Platte für Justierung mit Seite A auflegen.	VR901 (Abb. 26)	1. Den Ein/Aus-Schalter einschalten und den Tonarm zu einer blanken Stelle der Platte hin bewegen. 2. VR901 so abgleichen, daß die Ausgangsspannung 4V ± 0,4V verträgt.
4	**Sensorauflösung**	1. Die Abdeckung entfernen und die Anschlußverbindung für Justierung in den Anschluß CN901 einstecken. (Abb. 29) 2. Das Oszilloskop an Stift 7 (+) und Stift 1 (–) anschließen. 3. Die Platte für Justierung mit Seite A auflegen.	VR902 (Abb. 26)	1. Den Ein/Aus-Schalter einschalten. 2. Die Programmtaste drücken, um sie den Tonarm suchen zu lassen. (Ausgangsleistung tritt auf zwischen den Musikstücken.) 3. VR902 so abgleichen, daß die maximale Ausgangsleistung zwischen den Musikstücken 3V ± 0.3V beträgt. (Abb. 30)
5	**Lift-Zeitsteuerung**	1. Die Abdeckung entfernen und die Anschlußverbindung für Justierung in den Anschluß CN901 einstecken. (Abb. 29) 2. Das Gerät an einen Verstärker anschließen. (Phono-Ausgang) 3. Stift 3 (+) und Stift 1 (–) an Kanal (1) des Zweikanal-Oszilloskops anschließen. 4. Den Lautsprecheranschluß des Verstärkers an Kanal (2) die Zweikanal-Oszilloskops anschließen. 5. Stift 2 und Stift 1 verbinden. (Stummschaltungsbetrieb stoppt.) 6. Die Platte für Justierung mit Seite B auflegen.	VR903 (Abb. 26)	1. Den Ein/Aus-Schalter einschalten. 2. Den Tonarm zu einer bespielten Stelle (enge Rillen) der Platte bewegen und die Lifttaste drücken, um ihn abzusenken. 3. Die Zeit bis zur Beendigung des Liftbetriebs (Anstieg des Liftsignals) überprüfen, nachdem die Nadelspitze die Plattenoberfläche berührt. 4. VR903 so abgleichen, daß die Zeit bis zur Beendigung des Liftbetriebs 0,3 ~ 0,5 sec. beträgt. (Abb. 31) *** Anmerkung** Die Kippzeit des Oszilloskops auf 0,2 sec/cm oder 0,5 sec/cm einstellen. Zum Beispiel im Falle von 0,2 sec/cm, ist so zu justieren, daß Liftbetriebsbeendigungssignal 2 Skalenmarkierungen (0,4 sec.) später als die Abgabe des Phono-Ausgangssignals auftritt.
6	**Absenken zwischen Musikst**	1. Das Gehäuseoberteil öffnen und den Gehäuseschalter mit Klebband in der gedrückten Stellung arretieren. 2. Die Platte für Justierung mit Seite B auflegen. 3. Das Gehäuseoberteil schließen. 4. Das Gerät an den Verstärker anschließen. (Die Lautsprecher an die Lautsprecher-Anschlüsse anschließen.)	Sensor-Verstellschraube (Abb. 32)	1. Den Ein/Aus-Schalter einschalten. 2. Die Programmtaste 2 und anschließend den Startschalter drücken. 3. Nach Beendigung des Liftbetriebs die Programmtaste 2 zum Zwecke des Überspringens drücken. 4. Überprüfen, daß die Absenkposition bei "20 ~ 21" liegt. 5. Falls die Absenkposition falsch ist, das Gehäuseoberteil öffnen und die Sensor-Verstellschraube drehen. 6. Das Gehäuseoberteil schließen und die Programmtaste 2 drücken. 7. So abgleichen, daß die Absenkposition auf "20 ~ 21" zu liegen kommt. Schritte 4 ~ 7 wiederholen.

Schritt	Gegenstand	Vorbereitungen für die Justierung	Zu justierende Teile	Justiermethode
7	**Tonarm-Spurfehlwinkel**	1. Das Gehäuseoberteil öffnen und den Gehäuseschalte mit Klebband in der gedrückten Stellung arretieren. 2. Das Gehäuseoberteil schließen.	Justierschraube (Abb. 33)	1. Den Ein/Aus-Schalter einschalten und den Startschalter zum Bewegen den Tonarms nach innen drücken. 2. Das Gehäuseoberteil öffnen. 3. Die Justierschraube so weit drehen, daß die Tonarmmitte mit der V-Kerbe der Liftstange übereinstimmt.
8	**Servo-Verstärkung und Offsetspannung**	1. Das Gehäuseoberteil öffnen und den Gehäuseschalter mit Klebband in der gedrückten Stellung arretieren. 2. Das Gehäuseoberteil schließen. 3. Das Gleichstromvoltmeter an CN301 Anschluß 3 und den Erdungsanschluß anschließen. 4. Das Etikett der Tonarmabdeckung entfernen.	VR501 (Servo-Verstärkung) Leiterplatte (Offsetspannung) (Abb. 32)	1. Den Ein/Aus-Schalter einschalten und den Startschalter drücken, um den Tonarm nach innen zu bewegen. 2. Das Gehäuseoberteil öffnen. 3. Den Tonarm vollständig gegen rechts bewegen. VR501 dann so abgleichen, daß die Spannung 3,6V beträgt. (Servo-Verstärkung) 4. Den Tonarm zur Mitte hin stellen und überprüfen, daß die Ausgangsspannung 1,8V beträgt. 5. Falls die Spannung nicht 1,8V beträgt, die Schraube der Leiterplatte lösen und die Platte mit einem Schraubendreher nach links oder rechts bewegen, bis die Ausgangsspannung 1,8V beträgt. Nach der Justierung ist die Befestigungsschraube der Leiterplatte wieder festzudrehen. (Offset-Justierung)

FRANÇAIS

■ CARACTERISTIQUES

Les spécifications sont susceptibles d'être modifiées sans préavis.
Le poids et les dimensions donnés sont approximatifs.

■ Généralités

Alimentation: Pour l'Europe: CA50 Hz, 220V
Autres: CA50/60 Hz, 110–120/220–240V

Consommation. 11W

Dimensions: 43x8,8x35 cm
(LxHxP) 43x38,5x35 cm
(Hauteur maximum lorsque le dessus (couvercle protège-poussière) est ouvert.)

Poids. 5,1 kg

■ Platine de lecture

Type: Entraînement direct
Platine automatique
Départ automatique/Entrée automatique
Retour automatique
Sélection de plages programmable
Arrêt automatique
Auditon répétée
Sélection de vitesse automatique
Sélection automatique du diamètre
Sélection de vitesse manuelle possible
Détection de la présence d'un disque

Système d'entrainement: Entraînement direct
Moteur: Moteur C.C. sans balai
Système de commande d'entrainement: Réglage d'accrochage de phase par quartz
Plateau de lecture: Aluminium moulé sous pression
Diamètre 30 cm
Vitesses de la platine: 33-1/3 et 45 t/p.m.
Sélecteur de vitesse automatique
(Sélection manuelle possible)
Pleurage et scintillement: 0,012%de valeur efficace*
0,025% de valeur efficace (JIS C5521)
±0,035% de crête (IEC 98A Pondéré)

* Mesuré par l'obtention d'un signal provenant du générateur de fréquences incorporé de l'ensemble du moteur.

Ronflement: –56 dB (IEC 98A Non pondéré)
–80 dB (IEC 98A Pondéré)

■ Bras de lecture

Type: Bras de lecture d'alignement linéaire de type à équilibre dynamique avec suspension à la cardan à 4 pivots
Longueur effective: 105 mm
Angle d'erreur de piste. En deçà de ±0,1°
Masse réelle: 9 g (y compris la cellule pick-up)
Fréquence de résonance: 12 Hz
Moteur d'entraînement du bras de lecture: Moteur C.C.

■ Cellule pick-up

Type: Cellule pick-up stéréo à aimant mobile
Circuit magnétique: Noyau entièrement feuilleté
Réponse en fréquence: 10 Hz à 50 kHz
20 Hz à 10 kHz ± 1 dB
Tension de sortie: 2,5 mV à 1 kHz; 5 cm/s. zéro à vitesse latérale de crête (7 mV à 1 kHz; 10 cm/s., zéro à vitesse 45° de crête [DIN 45 000])
Séparation des canaux: 22 dB à 1 kHz
Equilibrage des canaux: En deçà de 1,8 dB à 1 kHz
Impédance de charge recommandée: 47 kΩ~100 kΩ
Elasticité (dynamique): 12×10^{-6} cm/dyne à 100 Hz
Plage de la force verticale d'appui: 1,25±0,25 g (12,5±2,5 mN)
Poids: 6 g (cellule seule)
Remplacement de la pointe de lecture: EPS-33ES (Forme elliptique)

■ REGLAGES

- **Equipement utilisé et conditions de service de l'appareil**

1. Oscilloscope (à deux canaux)
2. Voltmètre à C.C.
3. Disque (SFTR007) pour la mise au point
4. Connecteur (SZZP1010F) pour le réglage
5. Enlever la plaquette du fond et retirer le panneau de protection (Fig. 29).
6. Régler le sélecteur de sensibilité du détecteur optique sur "M".

Etape	Artiele	Préparatifs pour le réglage	Portion du réglage	Méthode de mise au point
1	**Position de démarrage**	1. Ouvrir le boîtier supérieur et placer un disque. 2. Mettre en circuit l'interrupteur d'alimentation. 3. Appuyer sur la touche "Start" (mise en marche).	Vis d'ajustement de la position descendante. (Fig. 26)	1. Tourner la vis d'ajustement de la position descendante. Si elle descend entre les plages, tourner la vis dans le sens des aiguilles d'une montre. Si elle descend à l'extérieur du disque, tourner la vis dans le sens inverse des aiguilles d'une montre.
2	**Fréquence des impulsions de rythme**	1. Raccorder l'émetteur Q1 à la broche 14 de IC301 (Fig. 27) 2. Raccorder l'oscilloscope à la broche 13 de IC301.	VR301 (Fig. 27)	1. Mettre en circuit l'interrupteur d'alimentation. 2. Ajuster VR301 de telle sorte que la forme d'onde de sortie soit de 40μs ± 2μs. (Fig. 28)
3	**Gain du dispositif dérecteur**	1. Retirer le panneau de protection et insérer le connecteur pour le réglage dans la borne CN901. (Fig. 29) 2. Raccorder l'oscilloscope à la broche 6 (+) et à la broche 1 (–). 3. Installer le disque pour la mise au point avec le côté A vers le haut.	VR901 (Fig. 26)	1. Mettre en circuit l'interrupteur d'alimentation et déplacer le bras de lecture sur la surface vierge du disque. 2. Ajuster VR901 de telle sorte que la tension de sortie soit de 4V ± 0,4V.
4	**Résolution du dispositif détecteur**	1. Retirer le panneau de protection et insérer le connecteur pour le réglage dans la borne CN901. (Fig. 29) 2. Raccorder l'oscilloscope à la broche 7 (+) et à la broche 1 (–). 3. Installer le disque pour la mise au point avec le côté A vers le haut.	VR902 (Fig. 26)	1. Mettre en circuit l'interrupteur d'alimentation. 2. Appuyer sur la touche de programmation pour la laisser rechercher le bras de lecture. (La puissance de sortie est déliverée entre les plages.) 3. Ajuster VR902 de telle sorte que la puissance de crête entre les plages soit de 3V ± 0.3V. (Fig. 30)

Etape	Artiele	Préparatifs pour le réglage	Portion du réglage	Méthode de mise au point
5	**Minuteur de pose/relevage**	1. Retirer le panneau de protection et insérer le connecteur pour le réglage dans la borne CN901. (Fig. 29) 2. Raccorder l'appareil à l'amplificateur. (Sortie pickup) 3. Connecter la broche 3 (+) et la broche 1 (–) an canal (1) de l'oscilloscope à deux canaux. 4. Connecter la borne du haut-parleur de l'amplificateur au canal (2) de l'oscilloscope à deux canaux. 5. Connecter la broche 2 et la broche 1. (Arrête le fonctionnement de l'accord silencieux.) 6. Installer le disque pour la mise au point avec le côté B vers le haut.	VR903 (Fig. 26)	1. Mettre en circuit l'interrupteur d'alimentation. 2. Déplacer le bras de lecture sur une partie enregistrée (sillon) du disque, et appuyer sur la touche de pose/relevage pour une opération de pose. 3. Vérifier la durée jusqu'à l'achèvement de la pose (augmentation du signal de pose) après que le pointe de lecture ait touchée la surface du disque. 4. Ajuster VR903 de telle sorte que la durée jusqu'à l'achèvement de la pose soit de 0,3 ~ 0,5 sec. (Fig. 31) *** Nota** Régler la durée de balayage de l'oscilloscope sur 0,2 sec./cm ou sur 0,5 sec./cm. Par exemple, dans le cas d'une plage de 0,2 sec./cm, l'ajuster de telle sorte que le signal d'achèvement de pose/relevage soit délivré à un étalonnage de 2 (0,4 sec.) plus tard que la délivrance du signal de sortie pick-up.
6	**Descente entre les plages**	1. Ouverir le boîtier supérieur et maintenir appuyée la touche du boîtier avec une bande adhésive. 2. Installer le disque pour la mise au point avec le côté B vers le haut. 3. Refermer le boîtier supérieur. 4. Raccorder l'appareil à o'amplificateur. (Raccorder les haut-parleurs aux bornes des hautparleurs.)	Vis de déchalage du dispositif détecteur. (Fig. 32)	1. Mettee en circuit l'interrupteur d'alimentation. 2. Appuyer respectivement sur la touche de programmation 2 et sur la touche de mise en marche. 3. Après l'achèvement de la pose, appuyer sur la touche de programmation 2 dans le but d'opèrer un saut. 4. S'assurer que la position descendante est au compte de "20 ~ 21". 5. Si le position descendante est incorrecte, ouvrir le boîtier supérieur et tourner la vis de décalage du dispositif détecteur. 6. Refermer le boîtier supérieur et appuyer sur la touche de programmation 2. 7. Ajuster de telle sorte que la position descendante soit au compte de "20 ~ 21". Répéteur les étapes 4 ~ 7.
7	**Angle de décalage du bras de lecture**	1. Ouvrir la boîtier supérieur et maintenir appuyée la touche du boîtier avec une bande adhésive. 2. Refermer le boîtier supérieur.	Vis de réglage (Fig. 33)	1. Mettre en circuit l'interrupteur d'alimentation et sppuyer sur la touche de mise en marche pour faire déplacer le bras de lecture vers l'intérieur. 2. Ouvrir le boîtier supérieur. 3. Tourner la vis de réglage de façon à ce que le centre du bras coïncide avec la rainure en V de la tige d'élévation.
8	**Amplification servo-mécanique et tension d'écart de réglage**	1. Ouvrir le boîtier supérieur et maintenir appuyée la touche du boîtier avec une bande adhésive. 2. Refermer le boîtier supérieur. 3. Raccorder le voltmètre à C.C. à la borne 3 de CN301 et à la borne de mise à la terre. 4. Retirer l'étiquette adhésive de la coiffe protectrice du bras de lecture.	VR501 (Amplification servo-mécanique) Plaquette à circuis imprimés (Tension d'écart de réglage) (Fig. 32)	1. Mettre en circuit l'interrupteur d'alimentation et appuyer sur la touche de mise marche pour faire déplacer le bras de lecture vers l'intérieur. 2. Ouvrir le boîtier supérieur. 3. Déplacer complètement le bras de lecture vers la droite. Puis, ajuster VR501 de telle sorte que la tension soit de 3,6V. (Amplification servo-mécanique.) 4. Régler le bras de lecture au centre et s'assurerque la tension de sortie soit de 1,8V. 5. Si la tension n'est pas de 1,8V, desserrer la vis de la plaquette à circuits imprimés et déplacer la plaquette vers la droite ou vers la gauche avec un tournevis, de telle sorte que la tension de sortie soit de 1,8V. Après la mise au point, resserrer la vis de la plaquette à circuits imprimés. (Ajustement de l'écart de réglage)

ESPAÑOL

■ ESPECIFICACIONES

Las especificaciones quedan sujetas a cambios sin aviso previo.
El peso y las dimensiones indicados son apromimados.

■ En general

Alimentación de corriente: Para Europa continental: CA50 Hz, 220V; Para otros paises: CA50/60 Hz 110–120/220–240V
Consumo de corriente: 11W
Dimensiones: 43x8,8x35 cm
(Ancho x Alto x Prof.) 43x38,5x35 cm (Altura máxima cuando la parte de arriba (tapa contra el poivo) está abierta.)
Peso: 5,1 kg

■ Sección del plato giratorio

Tipo: Accionamiento directo
Plato giratorio automàtico
Arranque automfico/ Comienzo automático
Retorno automático
Parada automática
Selección programable de bandas
Ejecución repetida
Selección automática de la velocidad
Es posible seleccionar la velocidad a mano
Selección automática del tamaño
Detección de presencia de disco
Método de accionamiento: Accionamiento directo
Motor: Motor de corriente continua sin escobillas
Método de control de accionamiento: Control enclavado de fase de cuarzo
Platillo del plato giratorio: Aluminio fundido
30 cm de diámetro
Velocidades del plato giratorio: 33-1/3 y 45 rpm
Selección automática de la velocidad
(También posibilidad de seleccionar a mano)
Ululaciones y trémolo: 0,012%WRMS*
0,025%WRMS (JIS C5521)
±0,035% cresta
(IEC 98A Ponderado)
* Medido obteniendo una señal proveniente del generador de frecuencias incorporado del conjunto del motor.
Ruido de rodadura: –56 dB (IEC 98A No ponderado)
–80 dB (IEC 98A Ponderado)

■ Sección del brazo sonoro

Tipo: Brazo sonoro de seguimiento lineal de tipo con equilibrio dinámico con suspensión cardánica de 4 pivotes
Longitud efectiva: 10,5 cm
Angulo de error de seguimiento: Inferior a ±0,1° aproxim.
Masa efectiva: 9 g (incluyendo el cartucho)
Frecuencia de resonancia: 12 Hz
Motor de accionamiento del brazo sonoro: Motor de corriente continua

■ Sección del cartucho

Tipo: Cartucho estereofónico de imán móvil
Circuito magnético: Núcleo totalmente laminado
Respuesta de frecuencia: 10 Hz a 50 kHz
20 Hz a 10 kHz ±1 dB
Voltaje de salida: 2,5 mV a 1 kHz
Velocidad lateral de cero a cresta de 5 cm/s
(7 mV a 1 kHz. Velocidad de 45° de cero a cresta de 10 cm/s [DIN 45 000])
Separación de canales: 22 dB a 1 kHz
Equilibrio de canales: Inferior a 1,8 dB a 1 kHz
Impedancia de carga recomendada: 47 kΩ a 100 kΩ
Elasticidad (dinámica): 12×10^{-6} cm/dina a 100 Hz
Radio de presión de la aguja: 1,25 ±0,25 g (12,5 ±2,5 mN)
Peso: 6 g (cartucho solamente)
Aguja de recambio: EPS-33ES (Aguja eliptica)

■ AJUSTES

● Equipos usados y estado del aparato

1. Osciloscopio (dos canales)
2. Voltímetro de corriente continua
3. Disco (SFTR007) de ajuste
4. Conector de ajuste
5. Quitar el tablero del fondo y separar la tapa. (Fig. 29)
6. Poner el selector de sensibilidad del sensor óptico en "M".

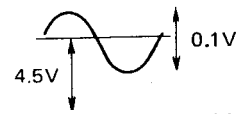
Paso	Punto tratado	Preparativos para el ajuste	Porción a ajustar	Manera de hacer el ajuste
1	**Posición de arranque**	1. Abrir el gabinete superior y colocar el disco. 2. Encender el interruptor de la corriente. 3. Empujar el interruptor de arranque ("Start").	Tornillo de regulación de la posición de descenso (Fig. 26)	1. Hacer girar el tornillo de regulación de la posición de descenso. Si se deposita en medio de una pieza, girar el tornillo hacia la derecha. Si se deposita fuera del disco, girar el tornillo hacia la izquierda.
2	**Frecuencia del reloj**	1. Conectar el emisor Q1 al pasador 14 de IC301. (Fig. 27) 2. Conectar el osciloscopio al pasador 13 de IC301.	VR301 (Fig. 27)	1. Encender el interruptor de la corriente. 2. Regular VR301 de manera tal que el ciclo de la forma de onda de salida sea de 40μs ± 2μs. (Fig. 28)
3	**Ganancia del sensor**	1. Quitar la tapa y meter el conector de ajuste en el borne CN901. (Fig. 29) 2. Conectar el osciloscopio al pasador (+) 6 y al pasador (–) 1. 3. Colocar el disco de ajuste con el lado A mirando hacia arriba.	VR901 (Fig. 26)	1. Encender el interruptor de la corriente y mover el brazo sonoro sobre la porción sin grabar del disco. 2. Regular VR901 de manera tal que la tensión de salida sea de 4V ± 0,4V.
4	**Resolución del sensor**	1. Quitar la tapa y meter el conector de ajuste en el borne CN901. (Fig. 29) 2. Conectar el osciloscopio al pasador (+) 7 y al pasador (–) 1. 3. Colocar el disco de ajuste con el lado A mirando hacia arriba.	VR902 (Fig. 26)	1. Encender el interruptor de la corriente. 2. Apretar la tecla de programas para que busque el brazo sonoro. (La salida se suministra entre las piezas.) 3. Regular VR902 de manera tal que la salida de cresta entre las piezas sea de 3V ± 0.3V. (Fig. 30)
5	**Cronizador de colocación**	1. Quitar la tapa y meter el conector de ajuste en el borne CN901. (Fig. 29) 2. Conectar el aparato al amplificador. (Salida para fonógrafo) 3. Conectar el pasador (+) 3 y el (–) 1 al canal (1) de los dos canales de que dispone el osciloscopio. 4. Conectar el borne pare altoparlante del amplificador al canal (2) de los dos canales de que dispone el osciloscopio. 5. Conectar el pasador 2 y el 1. (Cesa la operación de silenciamiento.) 6. Colocar el disco de ajuste con el lado B mirando hacia arriba.	VR903 (Fig. 26)	1. Encender el interruptor de la corriente. 2. Mover el brazo sonoro sobre una porción gradada (con surcos) del disco y apretar el interruptor de colocación para hacer que se deposite. 3. Revisar el tiempo requerido hasta completar la colocación (subida de la señal de colocación) después que la aguja haya tocado la superficie del disco. 4. Regular VR903 de manera tal que el tiempo hasta completar la colocación sea de 0,3 a 0,5 de segundo. (Fig. 31) *** Nota:** Poner el tiempo de barrido del oscilloscopio en 0,2 s/cm o en 0,5 s/cm. Por ejemplo, en el caso de un alcance de 0,2 s/cm, regular de manera tal que la señal de terminación de colocación resulte suministrada 2 escalas (0,4 de segundo) más tarde que el suministro de la señal de salida del fonógrafo.
6	**Descenso entre las piezas**	1. Abrir el gabinete superior y sujetar el interruptor del mismo con cinta. 2. Colocar el disco de ajuste con el lado B mirando hacia arriba. 3. Cerrar el gabinete superior. 4. Conectar el aparato al amplificador. (Conectar los altoparlantes a los bornes para conexión de los mismos.)	Tornillo de desplazamiento del sensor (Fig. 32)	1. Encender el interruptor de la corriente. 2. Apretar la tecla de programa 2 seguida del interruptor de arranque. 3. Una vez que el brazo sonoro haya descendido, apretar la tecla de programa 2 con el fin de saltar. 4. Asegurarse de que la posición de descenso se encuentre en el número "20 ~ 21". 5. De estar equivocada la posición de descenso, abrir el gabinete superior y girar el tornillo de desplazamiento del sensor. 6. Cerrar el gabinete superior y apretar la tecla de programa 2. 7. Regular de manera tal que la posición de descenso quede en el número "20 ~ 21". Repetir los pasos del 4 al 7.
7	**Angulo de descentramiento del brazo sonoro**	1. Abrir el gabinete superior y sujetar el interruptor del mismo con cinta. 2. Cerrar el gabinete superior.	Tornillo de ajuste (Fig. 33)	1. Encender el interruptor de la corriente y apretar el interruptor de arranque para hacer el brazo sonoro se mueva hacia adentro. 2. Abrir el gabinete superior. 3. Girar el tornillo de ajuste de manera tal que el centro del brazo concuerde con la ranura en V de la barra de elevación.
8	**Ganancia del servomecanismo y tensión de desnivel**	1. Abrir el gabinete superior y sujetar el interruptor del mismo con cinta. 2. Cerrar el gabinete superior. 3. Conectar el voltímetro de corriente continua al borne 3 de CN301 a al borne de conexión a tierra. 4. Quitar la etiqueta de la tapa del brazo sonoro.	VR501 (Ganancia del servomecanismo) P.C.B. (Tablero de circuito impreso) (Tensión de desnivel) (Fig. 32)	1. Encender el interruptor de la corriente y apretar el interruptor de arranque para hacer que el brazo sonoro se desplace hacia adentro. 2. Abrir el gabinete superior. 3. Desplazar el brazo sonoro completamente hacia la derecha. A continuación, regular VR501 de manera tal que la tensión resulte de 3,6V. (Ganancia del servomecanismo) 4. Colocar el brazo sonoro en el centro y asegurarse de que la tensión de salida sea de 1,8V. 5. Si la tensión no corresponde a 1,8V, aflojar el tornillo del tablero de circuito impreso y mover el tablero hacia la derecha o hacia la izquierda usando un destornillador de manera que la tensión de salida resulte de 1,8V. Acabado de regular, volver a apretar el tornillo del tablero de circuito impreso. (Ajuste de desnivel)

Printed in Japan
83079900 Ⓗ AM

Unsatable rotation

FG amplifier circuit

1. Conduction check of FG coil.
2. Waveform of terminal ⑮ of IC201.

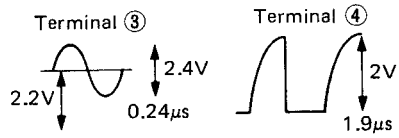


NO → FG coil, IC201, R203, R205, C201~203

YES ↓

Quartz oscillator circuit

1. Waveforms of terminals ③ and ④ of IC201.

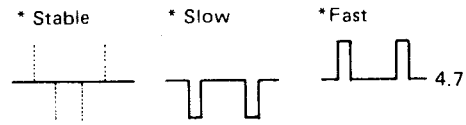


NO → X201, IC201, C204~206

YES ↓

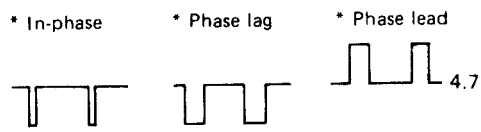
Speed and phase control circuit

1. Waveform of terminal ⑭ of IC201



33rpm 20ms (50.5 Hz)

2. Waveform of terminal ⑬ of IC201.



33rpm 10ms (101 Hz)

NO → IC201, IC101

Arm motor does not rotate

Motor control circuit

1. DC voltage at each terminal of IC301.

	㉜	㉝	㉞	㉟
Stop	5V	5V	0.2V	0.2V
Lead-in	0V	5V	0.2V	0.8V
Return	5V	0V	0.8V	0.2V

2. DC voltage at each terminal of IC401.

	①	②	③	⑤	⑥	⑦
Stop	0.1V	3.9V	3.8V	3.8V	3.9V	0.1V
Lead-in	10.3V	2V	3.8V	3.8V	3.9V	0.1V
Return	0.1V	3.9V	3.8V	3.8V	2V	10.3V

3. DC voltage at each terminal of Q401~404.

	Q401		Q403	
	Ⓑ	Ⓔ	Ⓑ	Ⓒ
Stop	0.1V	0.1V	0.2V	0.1V
Lead-in	8.8V	8.2V	0.8V	8.2V

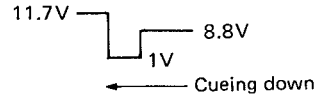
	Q402		Q404	
	Ⓑ	Ⓔ	Ⓑ	Ⓒ
Stop	0.1V	0.1V	0.2V	0.1V
Return	8.8V	8.2V	0.8V	8.2V

NO → IC301, IC401, Q401~404, RF1, Motor

Cueing down/ up dones not work

Cueing control circuit

1. DC voltage at terminals ㊲ and ㊳ of IC301.
   - Terminal ㊲ . . . . . During cueing and down (0.8V)
   - Terminal ㊳ . . . . . Only during cueing down (1.6V)
2. DC voltage of Q304 of collector.



NO → IC301, S312, Q303, Q304, Cueing plunger

■ REPLACEMENT PARTS LIST...Electric Parts

Notes: 1. Part numbers are indicated on most mechanical parts. Please use this part number for parts orders.
2. Important safety notice: Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts.
3. Bracketed indications in Ref. No. columns specify the area. Parts without these indications can be used for all areas.
4. The "Ⓢ" mark is service standard parts and may differ from production parts.

Areas

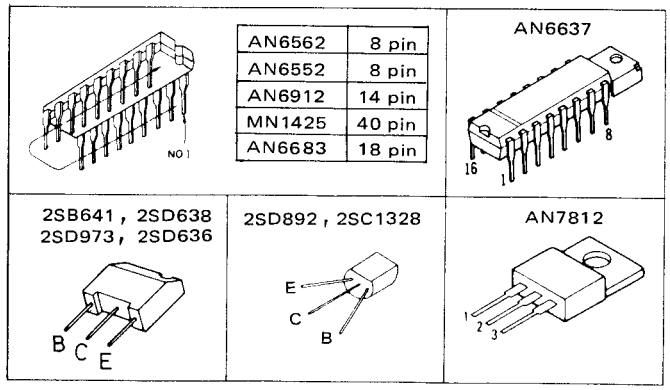
* [E] is available in Switzerland and Scandinavia.
* [EK] is available in United Kingdom.
* [XL] is available in Australia.
* [EG] is available in F.R. Germany.
* [EB] is available in Belgium.
* [EH] is available in Holland.
* [EF] is available in France.
* [Ei] is available in Italy.
* [EC] is available in Czechoslovakia.
* [XA] is available in Southeast Asia, Oceania, Africa, Middle Near East and Central South America.
* [XM] is available in Central South America.

Ref. No.	Part No.	Description
INTEGRATED CIRCUITS		
IC1	AN7812	Regulator
IC101	AN6637	Turntable Drive
IC201	AN6683	Turntable Control
IC301	MN1425FPF	System Control
IC401	AN6552	Arm Motor Control
IC801	AN6562	DC Amplifier & Band Pass Filter
IC802	AN6912	Comparator
TRANSISTORS		
Q1 Ⓢ	2SC1383Q	Regulator
Q302,303	2SD636	Muting Relay Drive,Cueing
306,802		Drive,V/I Converter & Biass
Q304	2SD892	Cueing Drive
Q305,308 309,801	2SB641	Switching, Waveform Shaping & Biass
Q401,402 Ⓢ	2SD973S	Arm Motor Control
Q403,404	2SD638	Arm Motor Control
DIODES		
D1 ⚠	SVDS1RBA20F	Rectifier
D2 Ⓢ	MA1056	5.6V Zener
D301~311, 320	SVDGL-9PR2F1	Light Emitting Diode
D312~317, 801,802, 804,805 Ⓢ	MA162A	Key Matrix

Ref. No.	Part No.	Description
DIODES		
D319,806 Ⓢ	RVDRD7R5FB	7.5V Zener
D501,502 Ⓢ	MA162A	Relay Protection
D503	SVDPR3432S	Light Emitting Diode
D803	MA1047A	4.7V Zener
CRYSTAL		
X201	SVQSH41TR	4.193MHz
VARIABLE RESISTORS		
VR301	EVN61AA00B54	Clock Frequency Adj.,50KΩ(B)
VR501	EVNK6AA00B53	Servo Gain Adj.,5KΩ(B)
VR901,902	EVN61AA00B15	Sensor Gain & Resolution Adj.,100KΩ(B)
VR903	EVN61AA00B24	Cueing Timer Adj.,20KΩ(B)
PHOTO INTERRUPTERS		
PC501	ON1186	Arm Position Detection
PC601	ON1161	Offset Angle Detection
PC701	ON2159	Blank Groove Detection
COMPONENT COMBINATIONS		
Z301,302, 307	EXBT44471K	470Ω×4
Z303	EXBP84333K	33KΩ×4
Z304	EXBP84103K	10KΩ×4
Z305	EXBP84332K	3.3KΩ×4
Z306	EXBP86122J	1.2KΩ×6
RELAY		
RL501	SFDYQ11N02	Muting

Ref. No.	Part No.	Description
HALL ELEMENTS		
H101,102	OH-002	Turntable Position Detector
SWITCHES		
S1 ⚠	SFDSC05N08	Power
S301~314	EVQQJ104K	Program,Repeat, Cueing & Start/Clear
S315,801	SFDSHSW0699	Speed Selector & Sensor Gain Selector
S601	SFDSD2MSL-C	Rest
S701	SFDSC05N01	Cabinet
S901 ⚠ [XA,XM,EK] only	SFDSHXW225-2	Voltage Selector
POWER TRANSFORMERS		
T1 [XL] ⚠	SLT48DTE13E	Power Source
T1 ⚠ [EK,XA,XM]	SLT57DT7E	Power Source
T1 ⚠ [other areas]	SLT48DT10E	Power Source
FUSES		
F1 ⚠ [EK,XA,XM]	XBA2C02T1B	T200mA,250V
F1 ⚠ [other areas]	XBA2C06T1B	T630mA,250V
F2 ⚠ [EK,XA,XM]	XBA2C06T1B	T630mA,250V

• Terminal guide of transistors, and IC's



■ RESISTOR AND CAPACITORS

Notes: 1. Part numbers are indicated on most mechanical parts. Please use this part number for parts orders.
2. Important safety notice: Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.
3. This "Ⓢ" mark is service standard parts and may differ from production parts.
4. Unless otherwise specified. All resistors are in OHMS (Ω) K = 1000Ω, M = 1000kΩ All capacitors are in MICROFARADS (μF) P = 10^{-6} μF

Numbering System of Resistor

Example

ERD	25	F	J	101
Type	Wattage	Shape	Tolerance	Value

ERG	1	AN	J	2R2
Type	Wattage	Shape	Tolerance	Value

Numbering System of Capacitor

Example

ECKD	1H	102	Z	F
Type	Voltage	Value	Tolerance	Peculiarity

ECEA	50	M	R47	R
Type	Voltage	Peculiarity use	Value	Special use

Resistor Type	Wattage	Tolerance
ERD : Carbon	25 : 1/4W	J : ±5%
ERG : Metal Oxide	1 : 1W	G : ±2%

ERD2FCG□□□ ⟶ Fuse type carbon (1/4W)
ERD10TLJ □□□ ⟶ Chip type carbon
ECUV1H □□□ ⟶ Chip type ceramic

Capacitor Type	Voltage: ECEA Type	Voltage: Others	Tolerance
ECEA : Electrolytic	1A : 10V	1H : 50V DC	J : ±5%
ECEB : Electrolytic	1C : 16V	2H : 500V DC	K : ±10%
ECKD : Ceramic	1E : 25V	1 : 100V	Z : +80%, −20%
ECQM : Polyester	1V : 35V		P : +100%, −0%
ECEB : Electrolytic	1H : 50V		M : ±20%
ECEB : Ceramic	50 : 50V		
ECKF : Ceramic			
ECKR : Ceramic			

Ref. No.		Part No.	Value
RESISTORS			
R1	Ⓢ	ERD25FJ101	100
R2	Ⓢ	ERD25FJ221	220
R3		ERG2SJ330	33
R4	Ⓢ	ERD25FJ221	220
R103	Ⓢ	ERD10TLJ104U	100K
R104	Ⓢ	ERXIANJ2R7	2.7
R105		ERD10TLJ270U	27
R201		ERD10TLJ393U	39K
R202		ERD10TLJ394U	390K
R203		ERD10TLJ680U	68
R204		ERD10TLJ151U	150
R205		ERD10TLJ223U	22K
R207		ERD10TLJ102U	1K
R208		ERD10TLJ680U	68
R320	Ⓢ	ERD25TJ333	33K
R321	Ⓢ	ERD25FJ471	470
R322	Ⓢ	ERD25FJ102	1K
R329	Ⓢ	ERD25FJ392	3.9K
R330	Ⓢ	ERD25FJ103	10K
R331	Ⓢ	ERD25FJ472	4.7K
R334,335	Ⓢ	ERD25FJ331	330
R336	Ⓢ	ERD25FJ103	10K
R337	Ⓢ	ERD25TJ223	22K
R338	Ⓢ	ERD25FJ272	2.7K
R341	Ⓢ	ERD25TJ563	56K
R343	Ⓢ	ERD25FJ103	10K
R345	Ⓢ	ERD25FJ472	4.7K
R346	Ⓢ	ERD25TJ333	33K
R347	Ⓢ	ERD25TJ563	56K

Ref. No.		Part No.	Value
RESISTORS			
R348	Ⓢ	ERD25TJ333	33K
R351	Ⓢ	ERD25FJ471	470
R352,353	Ⓢ	ERD25FJ222	2.2K
R357	Ⓢ	ERD25TJ223	22K
R358	Ⓢ	ERD25TJ333	33K
R359	Ⓢ	ERD25FJ471	470
R360	Ⓢ	ERD25TJ683	68K
R361	Ⓢ	ERD25FJ470	47
R401	Ⓢ	ERD25TJ683	68K
R402	Ⓢ	ERD25FJ222	2.2K
R403	Ⓢ	ERD25FJ102	1K
R404	Ⓢ	ERD25TJ224	220K
R405	Ⓢ	ERD25TJ683	68K
R406	Ⓢ	ERD25FJ222	2.2K
R407	Ⓢ	ERD25FJ102	1K
R408	Ⓢ	ERD25TJ224	220K
R409	Ⓢ	ERD25TJ273	27K
R410	Ⓢ	ERD25FJ103	10K
R501	Ⓢ	ERD25FJ561	560
R502	Ⓢ	ERD25FJ391	390
R601	Ⓢ	ERD25FJ681	680
R801	Ⓢ	ERD25TJ124	120K
R802	Ⓢ	ERD25FJ472	4.7K
R803	Ⓢ	ERD25TJ124	120K
R804	Ⓢ	ERD25FJ332	3.3K
R805	Ⓢ	ERD25FJ222	2.2K
R806	Ⓢ	ERD25FJ472	4.7K
R807	Ⓢ	ERD25FJ332	3.3K
R808	Ⓢ	ERD25FJ682	6.8K

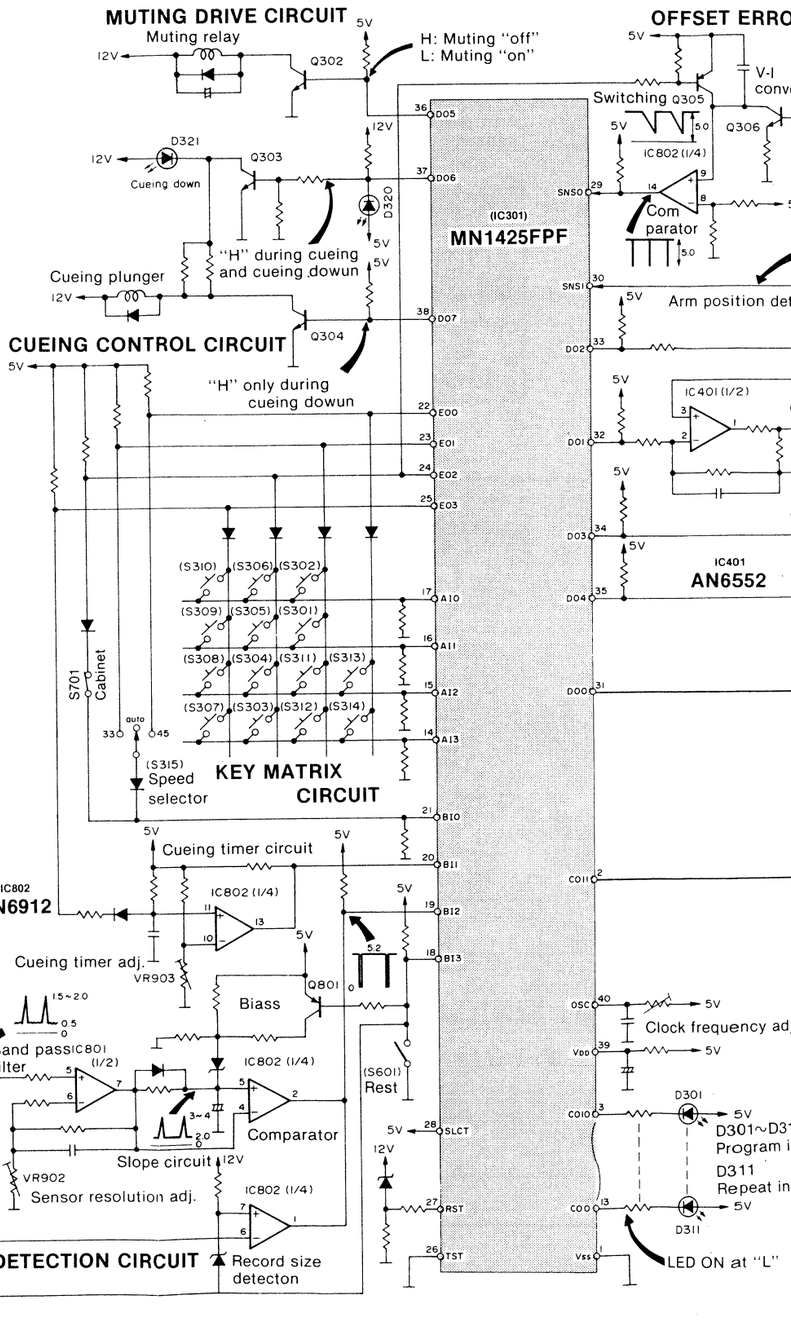
Ref. No.		Part No.	Value
RESISTORS			
R809	Ⓢ	ERD25FJ102	1K
R810	Ⓢ	ERD25FJ103	10K
R811	Ⓢ	ERD25TJ684	680K
R812	Ⓢ	ERD25TJ223	22K
R813	Ⓢ	ERD25TJ104	100K
R814	Ⓢ	ERD25TJ684	680K
R815	Ⓢ	ERD25TJ224	220K
R816	Ⓢ	ERD25FJ221	220
R817	Ⓢ	ERD25TJ104	100K
R818	Ⓢ	ERD25FJ102	1K
R819	Ⓢ	ERD25FJ822	8.2K
R820	Ⓢ	ERD25FJ222	2.2K
R821	Ⓢ	ERD25FJ272	2.7K
R822	Ⓢ	ERD25TJ220	22
R823	Ⓢ	ERD25FJ103	10K
R825	Ⓢ	ERD25FJ101	100
R826	Ⓢ	ERD25TJ223	22K
R828	Ⓢ	ERD25TJ223	22K
R829	Ⓢ	ERD25FJ682	6.8K
R840	Ⓢ	ERD25FJ102	1K
R841	Ⓢ	ERD25FJ272	2.7K
RF1	⚠	ERD2FCG180	18
CAPACITORS			
C1,2	⚠	ECQM1223KZ	0.022
C3	⚠	ECQM1223KZ	0.022
C4		ECEB1EU222	2200
C5		ECEA1CU330	33

Ref. No.	Part No.	Value
CAPACITORS		
C101	ECEA1CU330	33
C102	ECEA50ZR22	0.22
C103	ECQV05274JZ	0.27
C105,106 ⚠	ECEA1CN470S	47
C107	ECKD1H223ZF	0.022
C201	ECEA0JU470	47
C202	ECEA50ZR22	0.22
C203	ECQM1H683KV	0.068
C204	ECUV1H121JC	120
C205	ECUV1H330JC	33
C206	ECUV1H101JC	100
C207	ECEA0JU470	47
C208	ECEA1AU470	47
C301	ECCD1H470K	47P
C302	ECQM1H104KV	0.1
C303	ECKD1H104ZV	0.1
C304	ECEA0JSS330	33
C306	ECEA1EU4R7	4.7
C307	ECKD1H102KB	0.001
C308	ECKD1H104ZV	0.1
C401,402	ECQM1H223KV	0.022
C403	ECQV05224JZ	0.22
C501	ECEA1ES101	100
C601	ECFB1B104ZRM	0.1
C801	ECQM1H103KV	0.01
C802,803	ECQM1H104KV	0.1
C804	ECEA1CU220	22
C805	ECEA1CU470	47
C806	ECQM1H473KV	0.047

■ BLOCK DIAGRAM

• Description of each terminal of MN1425FPF

Pin No.	Symbol	Description
1.	VSS	Ground terminal
2	CO11	Turntable speed select output terminal (45 rpm at "H", 33 rpm at "L".)
3	CO10	Program LED display output terminal (LED ON at "L")
4	CO9	
5	CO8	
6	CO7	
7	CO6	
8	CO5	
9	CO4	
10	CO3	
11	CO2	
12	CO1	
13	CO0	Repeat LED display output terminal (LED ON at "L")
14	AI3	Key scan input terminal (Each key is read in through key scan with E-port.)
15	AI2	
16	AI1	
17	AI0	
18	BI3	Rest position detection input terminal ("L" when tonearm is on rest.)
19	BI2	Blank groove detection and record detection terminal [Blank groove detection pulse is active "L". When it is "H" at start, 30cm record is detected. When it is "L", it is judged that there is no 30cm record (17cm or 25cm record is present)].
20	BI1	Cueing time read input terminal.
21	BI0	Turntable speed select and cabinet opening/closing detection terminal. (Each operation is done through key scan with E-port.)
22	EO0	Key scan output terminal (Each key-is read in through key scan with A-port).
23	EO1	
24	EO2	
25	EO3	
26	TST	Test terminal (connected to Ground not used)
27	RST	Reset terminal (The microcomputer is reset at "L", and is not reset at "H".)
28	SLCT	Select terminal (The level is set to "H" by the select terminal of the inside counter.)
29	SNSO	Offset angle detection signal input terminal
30	SNSI	Arm position detection signal input terminal
31	DO0	Turntable start/stop select terminal (Start at "L", stop at "H".)
32	DO1	Arm motor drive control terminal
33	DO2	
34	DO3	
35	DO4	
36	DO5	Muting control terminal
37	DO6	Cueing control terminal ("H" during cueing and cueing down.)
38	DO7	Cueing control terminal ("H" only during cueing down.)
39	VDD	Power supply terminal
40	OSC	Oscillation terminal



00Ω, M = 1000kΩ
(μF) P = 10^{-6} μF

Tolerance
J : ±5%
K : ±10%
Z : +80%, −20%
P : +100%, −0%
M : ±20%

	Part No.	Value
RS		
	ECEA1CU330	33
	ECEA50ZR22	0.22
	ECQV05274JZ	0.27
	ECEA1CN470S	47
	ECKD1H223ZF	0.022
	ECEA0JU470	47
	ECEA50ZR22	0.22
	ECQM1H683KV	0.068
	ECUV1H121JC	120
	ECUV1H330JC	33
	ECUV1H101JC	100
	ECEA0JU470	47
	ECEA1AU470	47
	ECCD1H470K	47P
	ECQM1H104KV	0.1
	ECKD1H104ZV	0.1
	ECEA0JSS330	33
	ECEA1EU4R7	4.7
	ECKD1H102KB	0.001
	ECKD1H104ZV	0.1
	ECQM1H223KV	0.022
	ECQV05224JZ	0.22
	ECEA1ES101	100
	ECFB1B104ZRM	0.1
	ECQM1H103KV	0.01
	ECQM1H104KV	0.1
	ECEA1CU220	22
	ECEA1CU470	47
	ECQM1H473KV	0.047

■ BLOCK DIAGRAM

• Description of each terminal of MN1425FPF

Pin No.	Symbol	Description
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3	CO10	Program LED display output terminal (LED ON at "L")
4	CO9	
5	CO8	
6	CO7	
7	CO6	
8	CO5	
9	CO4	
10	CO3	
11	CO2	
12	CO1	
13	CO0	Repeat LED display output terminal (LED ON at "L")
14	AI3	Key scan input terminal (Each key is read in through key scan with E-port.)
15	AI2	
16	AI1	
17	AI0	
18	BI3	Rest position detection input terminal ("L" when tonearm is on rest.)
19	BI2	Blank groove detection and record detection terminal [Blank groove detection pulse is active "L". When it is "H" at start, 30cm record is detected. When it is "L", it is judged that there is no 30cm record (17cm or 25cm record is present)].
20	BI1	Cueing time read input terminal.
21	BI0	Turntable speed select and cabinet opening/closing detection terminal. (Each operation is done through key scan with E-port.)
22	EO0	Key scan output terminal (Each key-is read in through key scan with A-port).
23	EO1	
24	EO2	
25	EO3	
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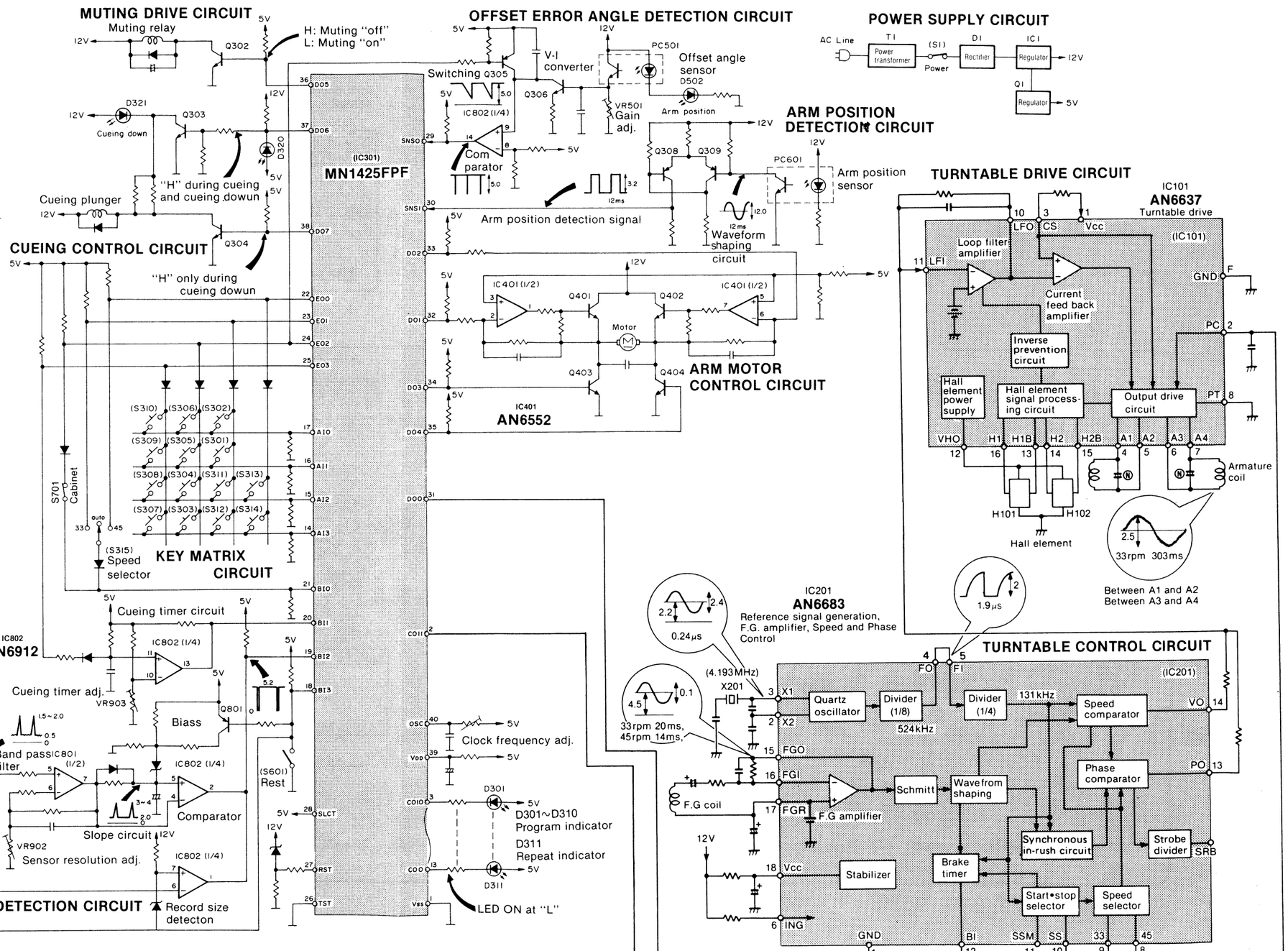
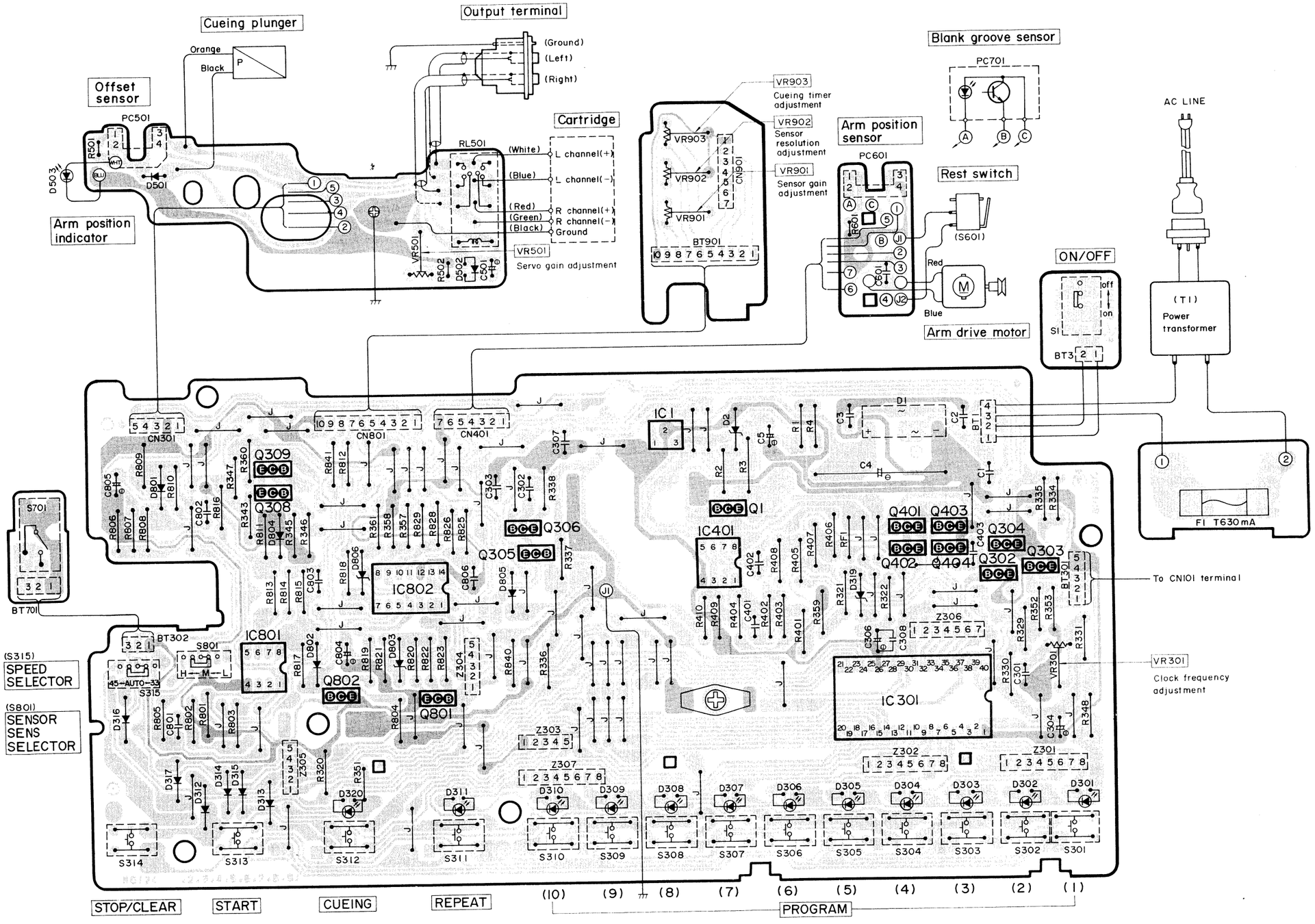
31	DO0	Turntable start/stop select terminal (Start at "L", stop at "H".)
32	DO1	Arm motor drive control terminal
33	DO2	
34	DO3	
35	DO4	
36	DO5	Muting control terminal
37	DO6	Cueing control terminal ("H" during cueing and cueing down.)
38	DO7	Cueing control terminal ("H" only during cueing down.)
39	VDD	Power supply terminal
40	OSC	Oscillation terminal

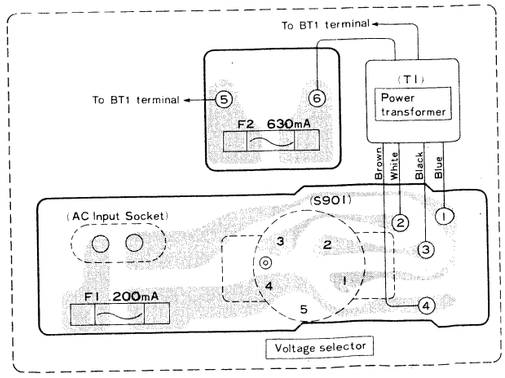


■ CIRCUIT BOARD AND WIRING CONNECTION DIAGRAM

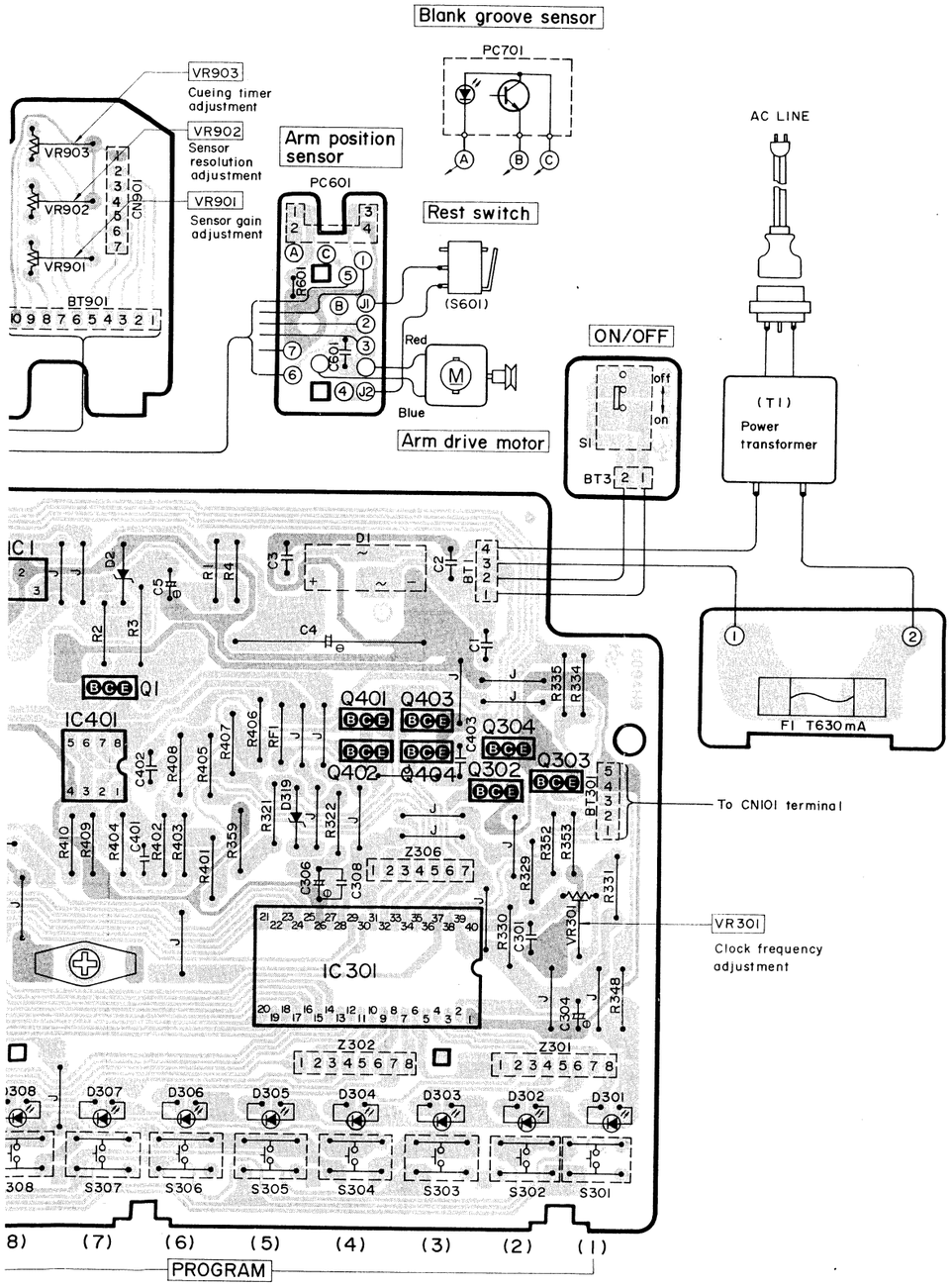
Ground (Earth) lines



- **Power source circuit**
  For [EK], [XA] and [XM] areas

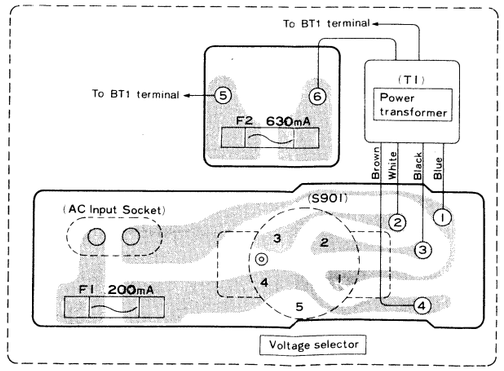


Ground (Earth) lines



21

- **Power source circuit**
  For [EK], [XA] and [XM] areas



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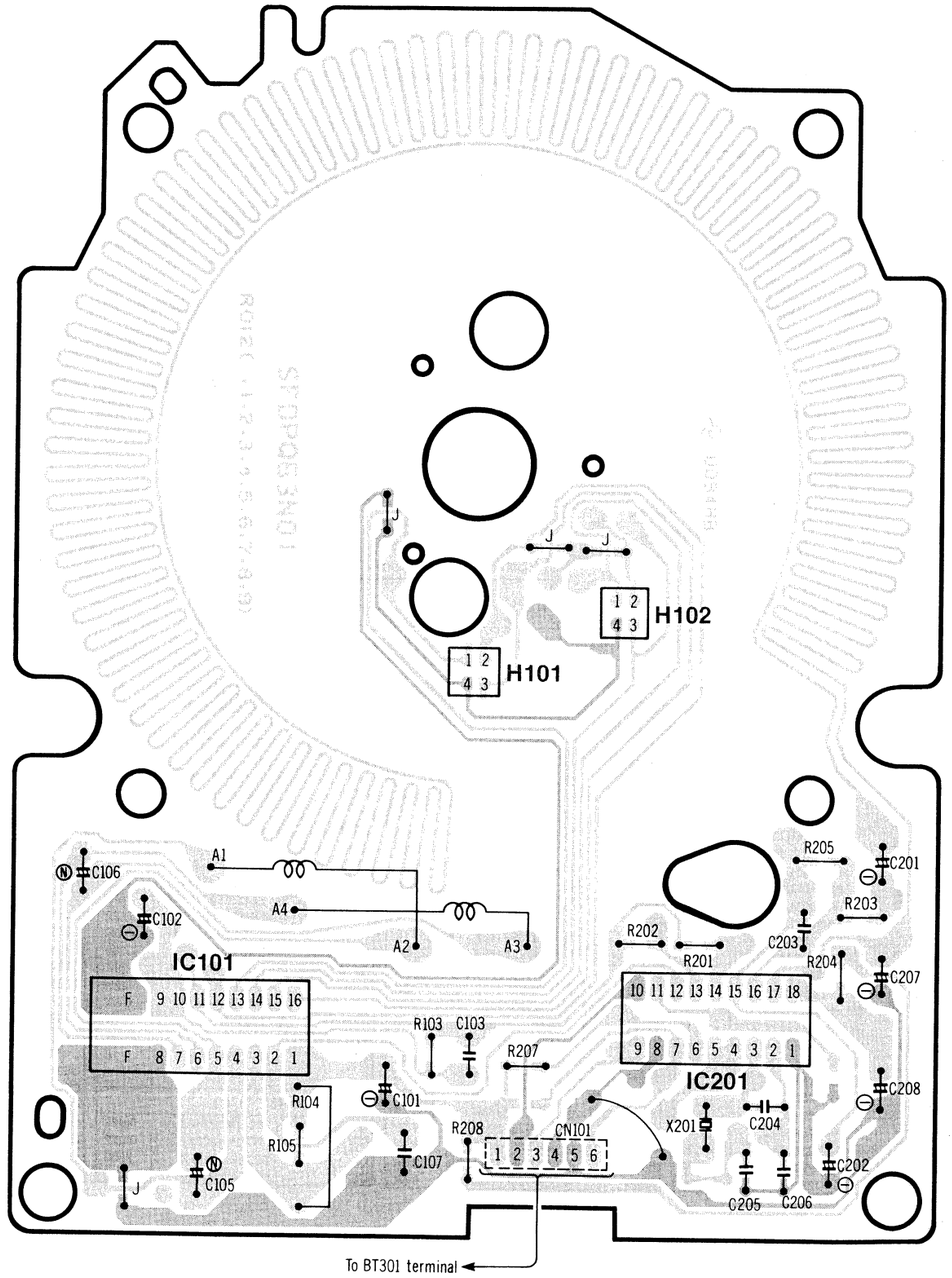


Constant voltage circuit

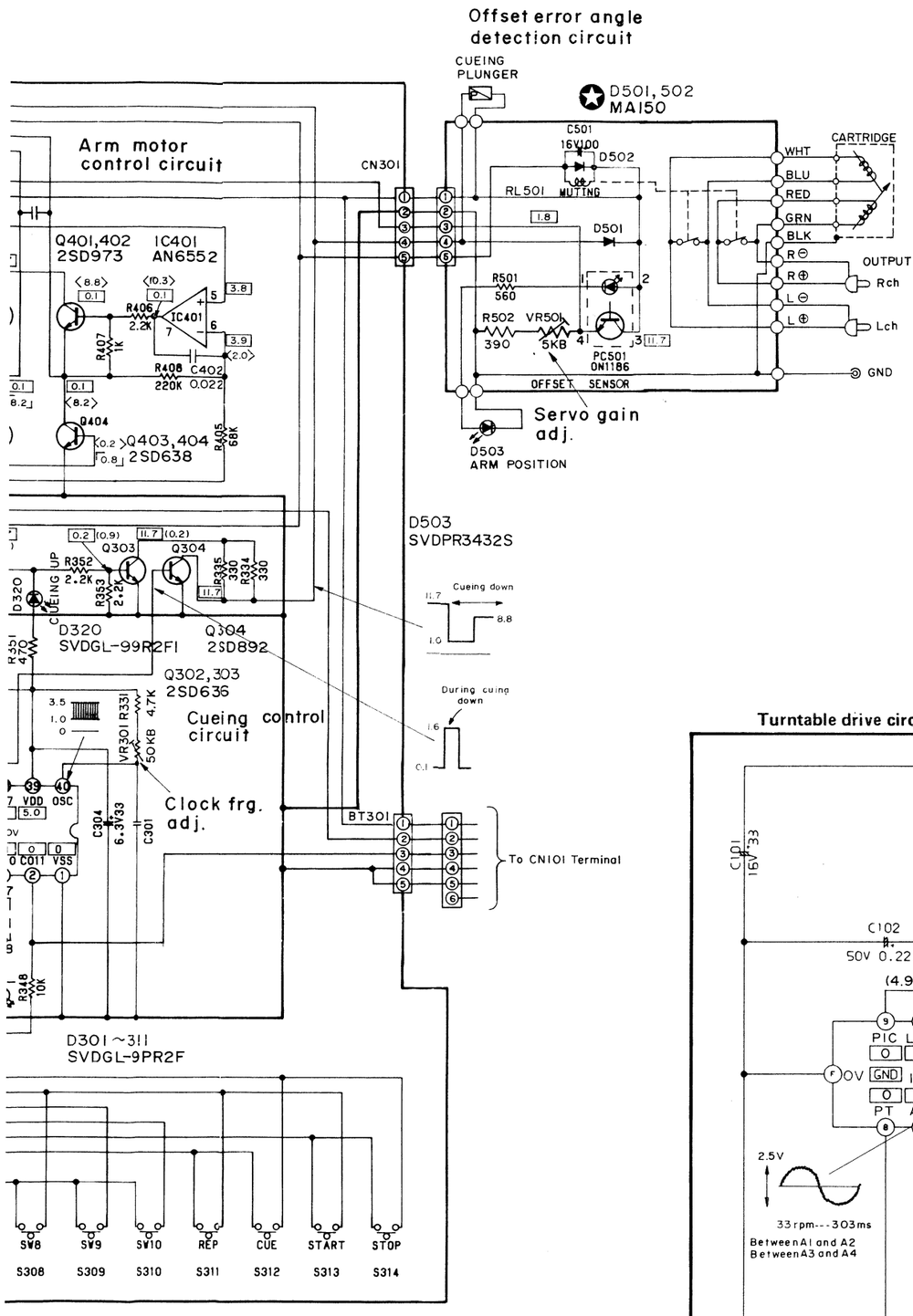
Arm position detection circuit

Arm motor control circuit

Blank groove detection circuit.

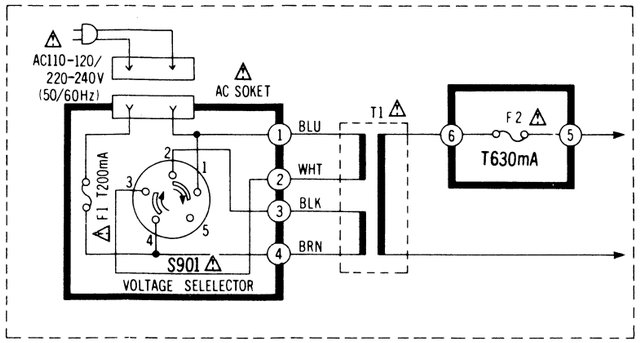
Key matrix circuit

10 11 12 13 14 15 16 17 18 19



* The part No. of diodes mentioned in the schematic diagram stand for production part No. Regarding the part No. with ✪ mark the production part No. are different from the replacement part No. Therefore, when placing an order for replacement part, please use the part No. in the replacement parts list.

● Power source circuit For [EK], [XA] and [XM] areas

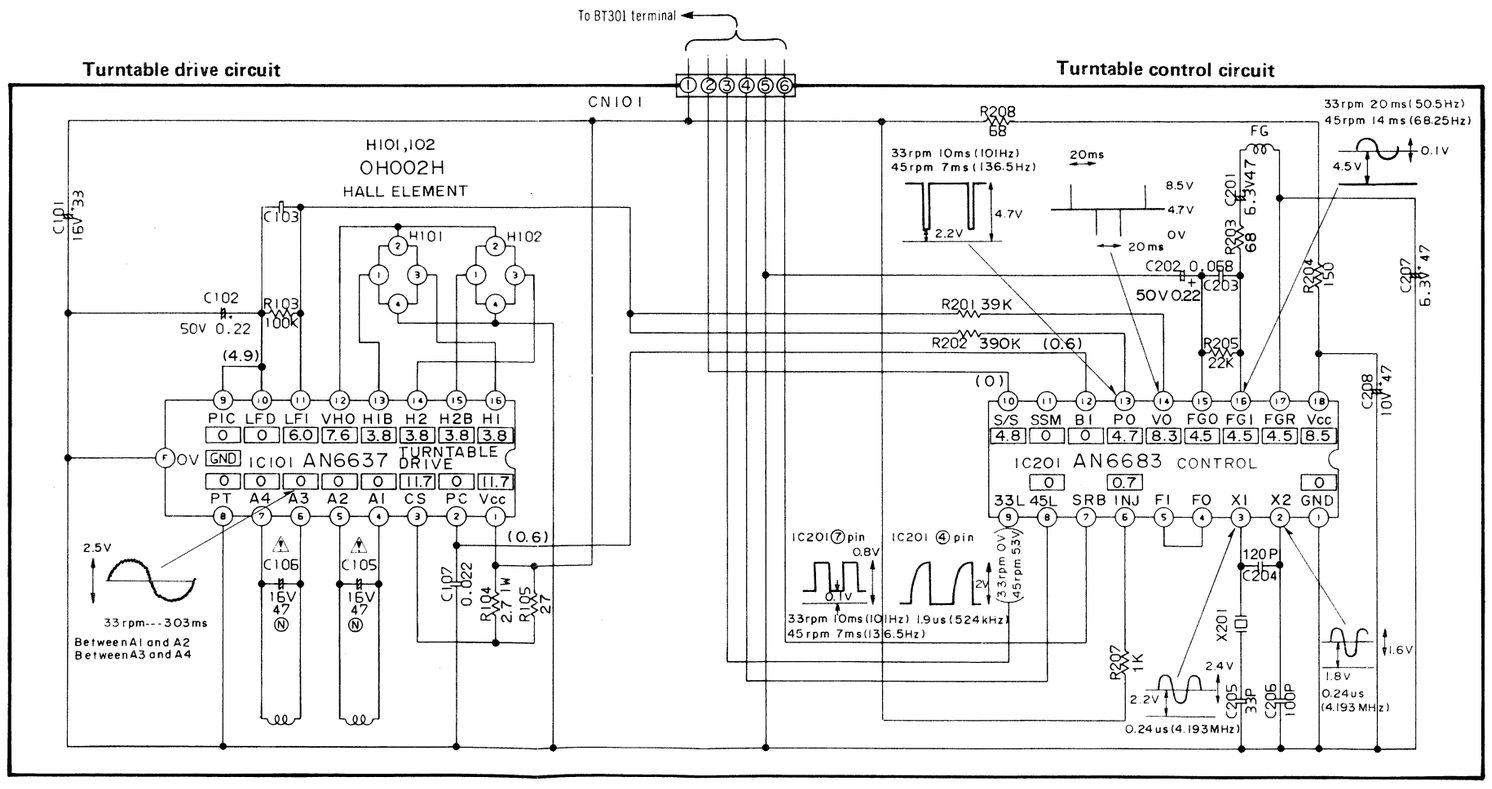


■ SCHEMATIC DIAGRAM

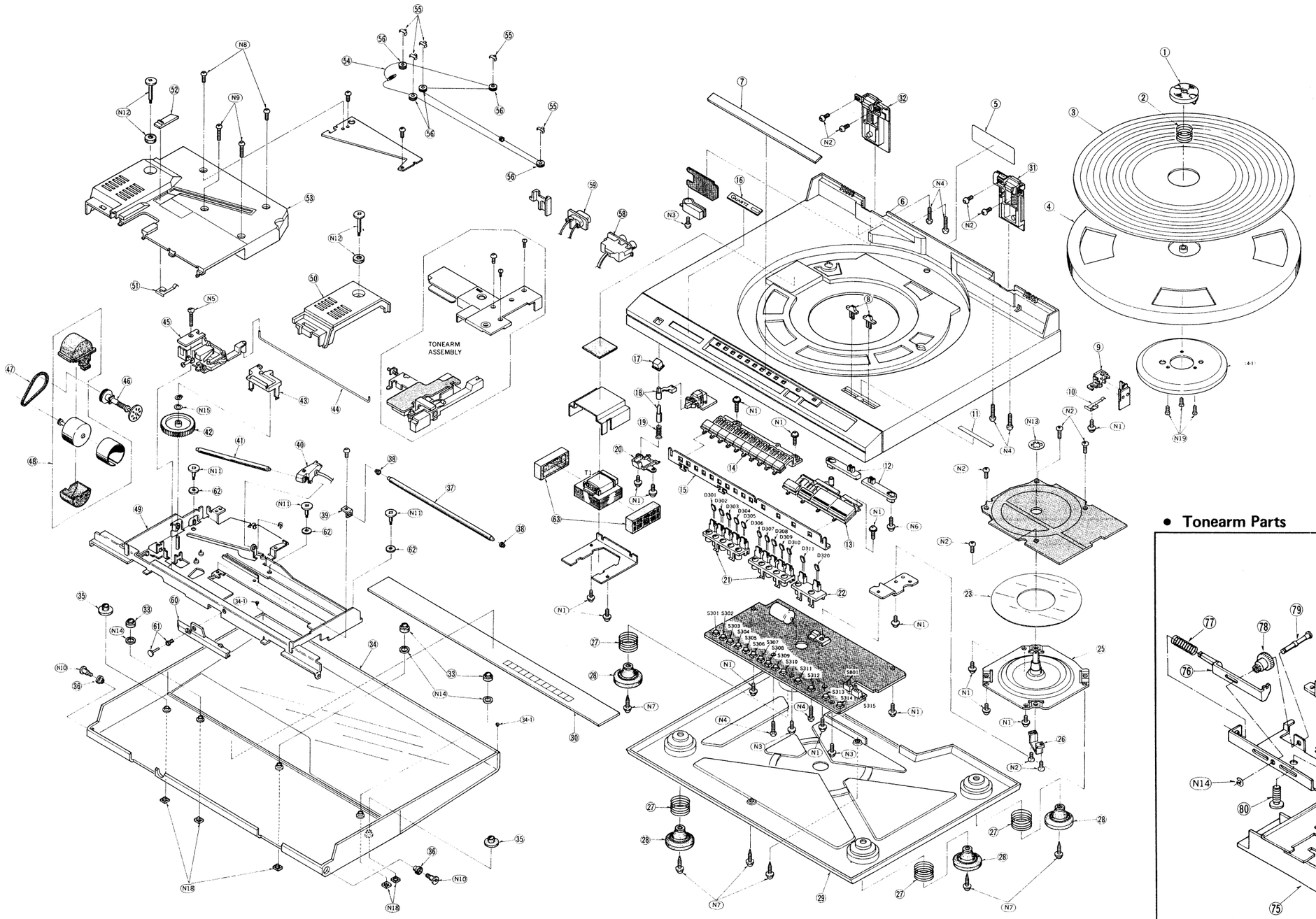
(The schematic diagram may be modified at any time with the development of new technology.)

Notes:

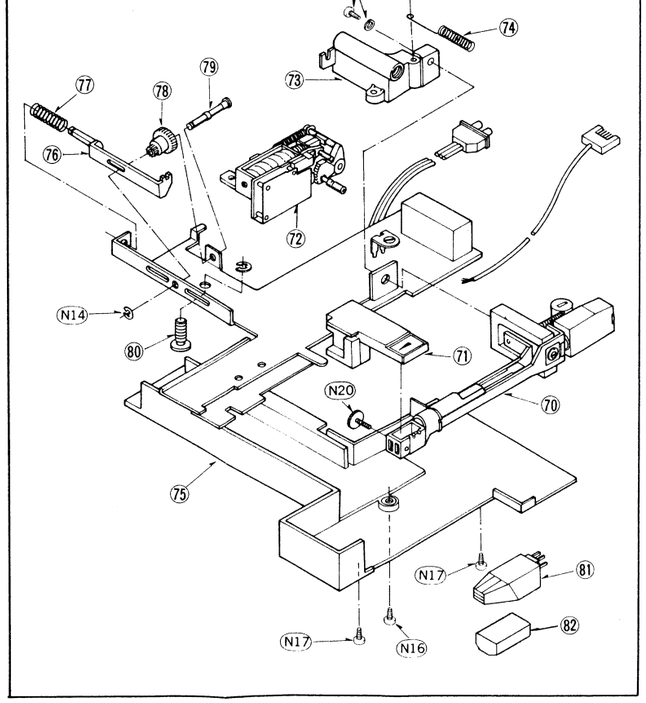
1. **S1** : On/off (power) switch in "**on**"position.
2. **S301 ~ S310** : Program switch (Program key 1 ~ 10).
3. **S311** : Repeat switch.
4. **S312** : Cueing control switch.
5. **S313** : Start switch.
6. **S314** : Stop/clear switch.
7. **S315** : Speed selector switch in "**auto**" position.
8. **S601** : Rest switch in "**off**" position. (Tonearm is off the rest position.)
9. **S701** : Cabinet (Reset) switch in "**on**" position. (Upper cabinet is closed.)
10. **S801** : Optical sensor sensitivity selector switch in "**M**" position.
11. **S901** : Voltage selector in "**110 – 120V**" position. 110 – 120V ◄► 220 – 240V
12. The voltage value and waveform are the standard values of this measured by DC electronic voltmeter (high impedance) and oscilloscope on the bais of chassis. Therefore, the voltage value and waveform may include some erroe due to the internal impedance of the tester or the measuring set.
    - * [ ] is the voltage when turntable is in stop.
    - * ( ) is the voltage when turntable is in rotation. (at 33 rpm)
    - * ⌐ ⌙ is the voltage when tonearm is in lead-in mode.
    - * 〈 〉 is the voltage when tonearm is in return mode.
    - * (( )) is the voltage at 45 rpm.
13. ——— Positive voltage lines.
14. Important safety notice: Components identifier by ⚠ make have special characteristics important for safety.



■ EXPLODED VIEW



- **Tonearm Parts**



■ REPLA

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Ref. No.		Part No
CABINET AND CHAS		
1		SFWEC06N
2		SFQAC06N
3		SFTGQ15N
4		SFTEQ15N
4-1		SFTMC07-(
5 (E,EI,EC)		SFNNQ15S
5 (EK)		SFNNQ15G
5 (XL)		SFNNQ15G
5 (XA,XM)		SFNNQ15×
5 (other Areas)		SFNNQ15R
6	○	SFACQ15N
6	Ⓚ	SFACQ15N
7		SFKKQ15N
8		SFKTD05N
9		SFUMC05N
10		SFQPC05N
11	○	SFNZQ15N
11	Ⓚ	SFNZQ15N
12		SFUMD05N
13		SFKTQ15N
14		SFKTQ15N
15		SFUPQ15N
16		SFKBQ15N
17		SFKTQ15N
18		SFXJBL3N
19		SFQABL3N
20		SFUMBL3N
21		SFUMQ15N
22		SFUMQ15N
23		SFMGQ34N
25		SFMZC06N
26		SFMZC05N
27		SFQCC05N
28		SFGAC05N
29		SFAUL12M
30		SFKKQ15N
31		SFATQ15N
32		SFATQ15N
33		SFGCC05N
34	○	SFADQ15N
34	Ⓚ	SFADQ15N
34-1		SFADC06N
35		SFGCD05N
36		SFGCC05N
37		SFXJC05N
38		SFGCC05N

■ REPLACEMENT PARTS LIST (Mechanical Parts)

Notes:
1. Part numbers are indicated on most mechanical parts. Please use this part number for parts orders.
2. Important safety notice: Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts.
3. Bracketed indications in Ref. No. columns specify the area. Parts without these indications can be used for all areas.
4. The "Ⓢ" mark is service standard parts and may differ from production parts.
5. Ⓚ -marked parts are used for black only, while ○-marked parts are for silver type only.
6. Parts other than Ⓚ- and ○-marked are used for both black and silver types.
7. The parenthesized numbers in the columns of description stand for the quantity per set.

Areas

* [E] is available in Switzerland and Scandinavia.
* [EK] is available in United Kingdom.
* [XL] is available in Australia.
* [EG] is available in F.R. Germany.
* [EB] is available in Belgium.
* [EH] is available in Holland.
* [EF] is available in France.
* [Ei] is available in Italy.
* [EC] is available in Czechoslovakia.
* [XA] is available in Southeast Asia, Oceania, Africa, Middle Near East and Central South America.
* [XM] is available in Central South America.

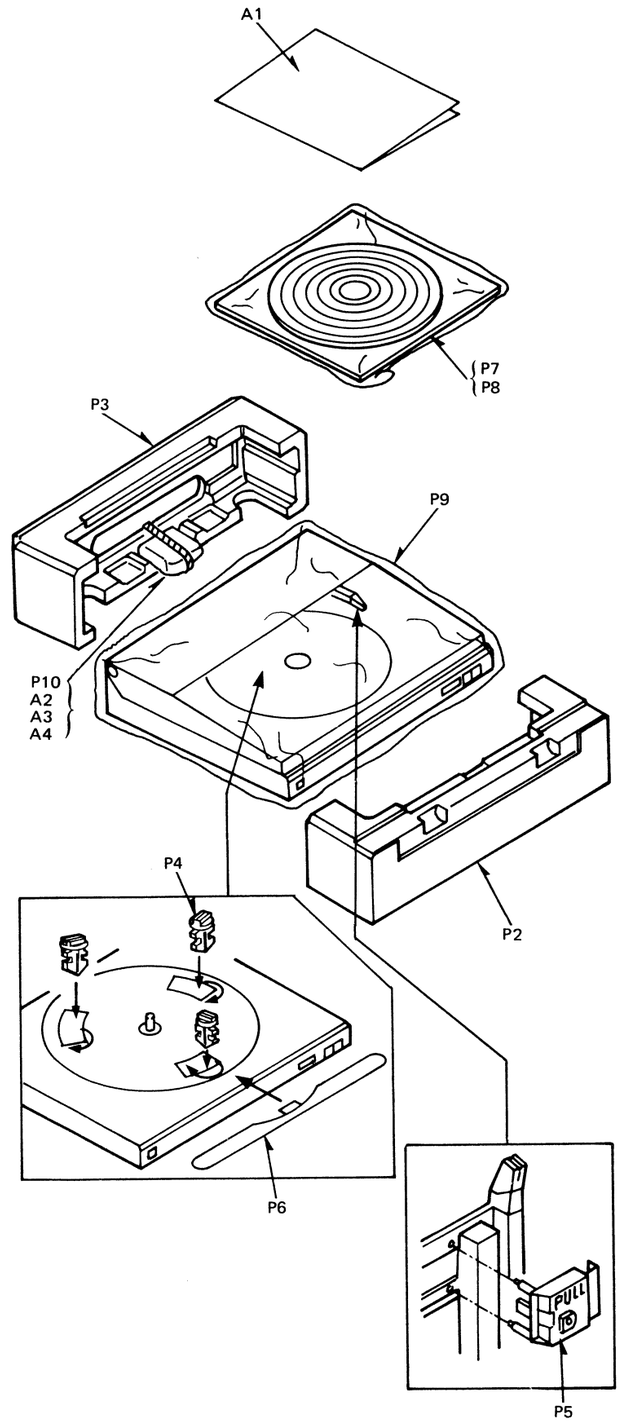
Black type model No. : SL-QL15 (K)

Ref. No.		Part No.	Description	
CABINET AND CHASSIS PARTS				
1		SFWEC06N01	45r.p.m.Adaptor	(1)
2		SFQAC06N01	Spring,45r.p.m.Adaptor	(1)
3		SFTGQ15N01	Turntable Mat	(1)
4		SFTEQ15N01	Turntable Platter	(1)
4-1		SFTMC07-01E	Magnet	(1)
5[E,EI,EC]		SFNNQ15S01	Name Plate	(1)
5[EK]		SFNNQ15G02	Name Plate	(1)
5[XL]		SFNNQ15G01	Name Plate	(1)
5[XA,XM]		SFNNQ15×01	Name Plate	(1)
5 [other Areas]		SFNNQ15R01	Name Plate	(1)
6	○	SFACQ15N01	Cabinet(Silver)	(1)
6	Ⓚ	SFACQ15N21	Cabinet(Black)	(1)
7		SFKKQ15N03	Surface Plate	(1)
8		SFKTD05N02	Knob,Speed Select	(2)
9		SFUMC05N15	Holder,Cabinet Switch	(1)
10		SFQPC05N01	Spring,Cabinet Switch	(1)
11	○	SFNZQ15N01	Label,Speed Select (Silver)	(1)
11	Ⓚ	SFNZQ15N21	Label,Speed Select (Black)	(1)
12		SFUMD05N03	Rod,Speed Select Knob	(2)
13		SFKTQ15N01	Button(A),start/stop	(1)
14		SFKTQ15N02	Button(B),Music Select	(1)
15		SFUPQ15N01	Holder,Operation Button	(1)
16		SFKBQ15N01	Badge,Cabinet	(1)
17		SFKTQ15N03	Button,On/Off Switch	(1)
18		SFXJBL3N02E	Shaft Ass'y,On/Off Switch	(1)
19		SFQABL3N02	Spring,On/Off Switch	(1)
20		SFUMBL3N05	Holder,On/Off Switch	(1)
21		SFUMQ15N02	Holder,Light Emitting Diodes	(2)
22		SFUMQ15N03	Holder,Light Emitting Diodes	(1)
23		SFMGQ34N01	Cover,Stator Coil	(1)
25		SFMZC06N01R	Stator Frame Ass'y	(1)
26		SFMZC05N01E	Thruster Ass'y	(1)
27		SFQCC05N01	Spring,Audio Insulator	(4)
28		SFGAC05N02	Audio Insulator	(4)
29		SFAUL12M01	Bottom Case	(1)
30		SFKKQ15N02	Graduated Plate	(1)
31		SFATQ15N01A	Hinge(Right)	(1)
32		SFATQ15N02A	Hinge(Left)	(1)
33		SFGCC05N03	Cushion Rubber, Dust Cover	(3)
34	○	SFADQ15N01E	Dust Cover(Silver)	(1)
34	Ⓚ	SFADQ15N21E	Dust Cover(Black)	(1)
34-1		SFADC06N02	Cushin Rubber, Dust Cover	(2)
35		SFGCD05N01	Cushion Rubber, Dust Cover	(2)
36		SFGCC05N06	Cushin Rubber, Dust Cover	(2)
37		SFXJC05N01	Guide Rail,Arm Drive	(1)
38		SFGCC05N05	Cushion Rubber, Guide Rail	(2)

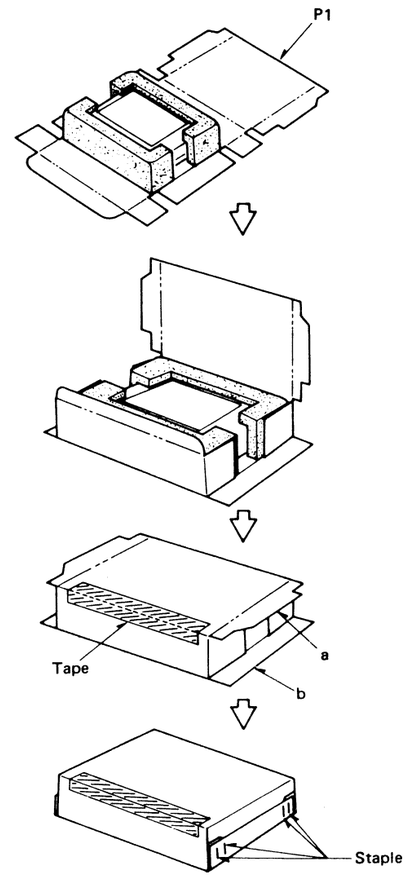
Ref. No.		Part No.	Description	
CABINET AND CHASSIS PARTS				
39		SFUPC05N03	Bracket,Guide Rail	(1)
40		SFUMC06N05E	Sensor Ass'y	(1)
41		SFXJC06N01	Guide Rail,Sensor Ass'y	(1)
42		SFUMC05N17	Arm Drive Wheel	(1)
43		SFUMC06N08	Holder,Lead Wires	(1)
44		SFUZC05N01	Rod,Rest Switch	(1)
45		SFUMC06N03A	Rest Switch Ass'y	(1)
46		SFUMC05N16A	Worm Ass'y	(1)
47		SFGBC10-01	Belt,Arm Drive	(1)
48		SFMHC05N01E	Motor Ass'y(with Pulley), Arm Drive	(1)
49		SFUKQ15N01A	Tonearm Base Ass'y	(1)
50		SFUMD05N02	Sub Cover,Tonearm Base	(1)
51		SFUPC15N11	Stopper,Shutter	(1)
52		SFUMC06N10	Shutter	(1)
53		SFUMQ15N01	Cover,Arm Drive Motor	(1)
54		SFUZC06N01E	Arm Drive Lope Ass'y	(1)
55		SFUMC05N23	Cap,Pulley	(5)
56		SFUMC05N22	Pulley	(5)
58		SFDHC06N01E	Jack,Phono Output	(1)
59[EK]	⚠	SFDJHSC0498	AC Socket	(1)
59[XA,XM]		SFDJHSC04912	AC Socket	(1)
59 [other areas]	⚠	SFDJHSC0492	AC Socket	(1)
60		SFUMC05N20	Holder,Lead Wires	(1)
61		SFUZC05N03	Lutch	(1)
62		SFGCC05N04	Cusion Rubber	(3)
63 [EK,XA,XM]		SFGCC05×01	Cushion Rubber,Power Transformer	(2)
63 [other areas]		SFGCC05N02	Cushion Rubber,Power Transformer	(2)
TONEARM PARTS				
70		SFPAM00501A	Tonearm	(1)
71		SFPAB00501E	Tonearm Position Indicator	(1)
72		SFPZB00601E	Lift Plate Ass'y	(1)
73		SFPAB00502	Bracket,Tonearm	(1)
74		SFPSP00503	Spring,Lead Wire	(1)
75		SFPCS00601	Cover,Tonearm Base	(1)
76		SFPZB00602	Cam,Adjustment	(1)
77		SFPSP00602	Spring,Adjustment Cam	(1)
78		SFPZB00603	Wheel,Adjustment Cam	(1)
79		SFPJK00601	Shaft,Wheel	(1)
80		SFPZB00604	Worm	(1)
81		EPC-P33AK	★Cartridge	(1)
		EPS-33ES	★Stylus	(1)
82		SFCNC03301	Cover,Stylus	(1)
SCREWS,WASHERS,RINGS AND NUTS				
N1	Ⓢ	XTV3+10BFN	Screw	(15)
N2	Ⓢ	XTV3+6BFN	Screw	(6)
N3	Ⓢ	XTV3+8BFN	Screw	(2)
N4	Ⓢ	XTV3+20BFN	Screw	(6)
N5	Ⓢ	XTV3+20BFN	Screw	(1)
N6		XTW3+10Q	Screw	(1)
N7		XTW3+14QFYR	Screw	(6)
N8		XTN3+12BFZ	Screw	(2)
N9		XTN3+20BFZ	Screw	(2)
N10		SF×GC05N03	Screw	(2)

Ref. No.		Part No.	Description	
SCREWS,WASHERS,RINGS AND NUTS				
N11		SF×GC05N02	Screw	(3)
N12		SF×GD05N01E	Screw	(2)
N13		SFXWC06N02	Washer	(1)
N14		SF×WC05N07	Washer	(3)
N15		SF×W551D2	Washer	(1)
N16	Ⓢ	XUC4FT	Retaining Ring	(1)
N17	Ⓢ	XUC2FT	Retaining Ring	(1)
N18		XNC3HS	Nut	(5)
N19		XTN3+5J	Screw	(3)
N20		SFPEV00502	Screw	(1)
ACCESSORIES				
A1[EK]		SFNUQ15G01	Instruction Book	(1)
A1[XL]		SFNUQ15L01	Instruction Book	(1)
A1[EG]		SFNUQ15R01	Instruction Book	(1)
A1[EF]		SFNUQ15F01	Instruction Book	(1)
A1[EI]		SFNUQ15I01	Instruction Book	(1)
A1[XA,XM]		SFNUQ15×01	Instruction Book	(1)
A1 [other areas]		SFNUQ15S01	Instruction Book	(1)
A2		SFDHC05N01	Phono Output Cord	(1)
A3		SFDLC05N01	Ground Wire	(1)
A4[EK]	⚠	SFDAC05G02	AC Cord	(1)
A4[XL]	⚠	SFDAC05L01	AC Cord	(1)
A4[XA,XM]	⚠	SFDAC05X02	AC Cord	(1)
A4 [other areas]	⚠	SFDAC05E02	AC Cord	(1)
A5[XA,XM] Only	⚠	SFDKI19118	2Pin Plug	(1)
A6[EI]		SFNZC06I01	Caution sheet,Unusual Record	(1)
A6[XA,XM]		SFNZC06M01	Caution sheet,Unusual Record	(1)
A6 [other areas]		SFNZC06XI01	Caution sheet,Unusual Record	(1)
PACKING PARTS				
P1[EF]	○	SFHPQ15C01	Carton Box(Silver)	(1)
P1[EF]	Ⓚ	SFHPQ15C21	Carton Box(Black)	(1)
P1 [other areas]	○	SFHPQ15M01	Carton Box(Silver)	(1)
P1 [other areas]	Ⓚ	SFHPQ15M21	Carton Box(Black)	(1)
P2		SFHHL13R01	Pad,Front	(1)
P3		SFHHL13R02	Pad,Rear	(1)
P4		SFHKC05N01	Clamper,Turntable Platter	(3)
P5		SFHKC05N02	Spacer,Tonearm	(1)
P6		SFHSL13R01	Spacer,Dust Cover	(1)
P7		SFHDD05N01	Pad,Turntable Mat	(1)
P8		SFYF33B35	Polyethylene Bag, Turntable Mat	(1)
P9		SFYH60×60	Polyethylene Bag, Cabinet	(1)
P10		SFYH17×16	Polyethylene Bag, Accessories	(1)

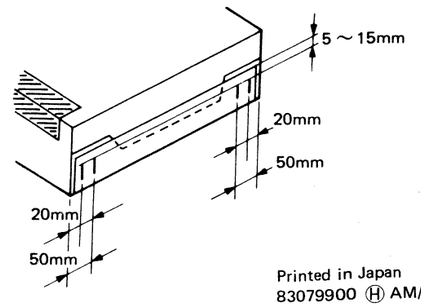
■ PACKING



1. Plase the unit (with cushions attached) as illustrated.
2. Fold the flaps according to the line marks.
3. Seal the top with adhesive tape.
   * Use gum tape or adhesive cloth tape of 50mm wide at least.
4. For the edges, first fold the flap "a" and then flap "b", and staple. Remember to staple only flap "b". (Use 15 or 16mm staple)



* Stapling positions are shown below.



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